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Appendices

Reference ARPA Contract #MDA972-92-C-0022



Microelectronics and Computer Technology Corp. 3500 M. Balcones Center Derive Austin, TX 78759

CLEARED FOR OPEN PUBLICATION

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DEPARTMENT OF DEFENSE

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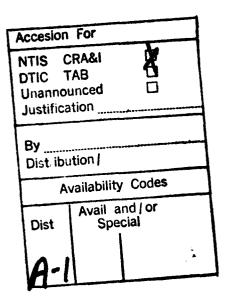
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Appendix

- A. DICE Concurrent Engineering Environment Overhead Presentation
- B. STEP Tools, Inc. Presentation Materials
- B1. The Standard Data Access Interface
- B2. Implementing AP Inter-operability using STEP-VIEWS
- B3. STEP Software for World-wide Manufacturing
- C. Detailed Description of CFI DR 1.0
- D. DIE Information Exchange (DIE) Format Reference Manual (Chapter 1)
- E. ASEM CAx Interface Specification Alliance Program Plan and Roadmap
- F. Market Study Telemarketing Survey
- F1. EDA DICE Market Study Telemarketing Program
- F2. Marketing Survey List
- F3. Basic Statistics
- G. EDA Commercial Vendor List



DTIC QUALITY ELLECTED 3

DICE Concurrent Engineering Environment Overhead Presentation

DICE CONCURRENT ENGINEERING ENVIRONMENT

- An environment for concurrent engineering
- Supports multiple applications
- A single, hierarchical database
- Limitations caused by applications functionality







OBJECTIVES

- Demonstrate current implementation
- Stimulate comments and recommendation
- Ideas for further development



S S S S





SOFTWARE APPLICATIONS

■ FINESSE MCM

IC Layout

MCM Design

■ OPUS

■ ALLEGRO

MCM Layout

■ AUTOCAD

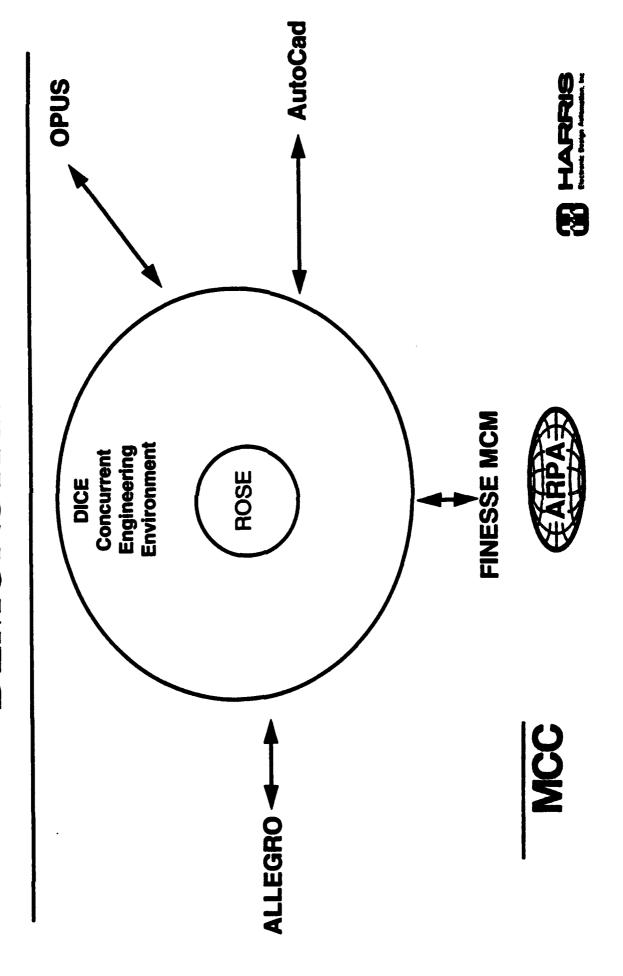
Mechanical Design

S S S S





DEMONSTRATION



IMPLEMENTATION

- Use available interface methods
- **FINESSE MCM command stream ASCII format**
- OPUS SKILL
- Allegro IGES 3.0 with extension
- AutoCAD C++ Program

O O E





STEP Tools, Inc. Presentation Materials B.

B1.	The Standard Data Access Interface

ARPA Market Study — Appendix



Raytheon AMS RPI STEP Tools

The Standard Data Access Interface (SDAI)

Presentation by Martin Hardwick of work performed by WG7 of ISO/STEP

Contributions by

Jim Fowler, NIST
Jan Van Mannen, Rutherford
Werner De Bruijn, TNO
Dave Price, IBM
Martin Hardwick, RPI/STEP Tools
Chia-Hui Shih, SDRC
Ernst Schlectendahl, RPK
Dave Nixon, DEC
Randy Watler, Auto-troi

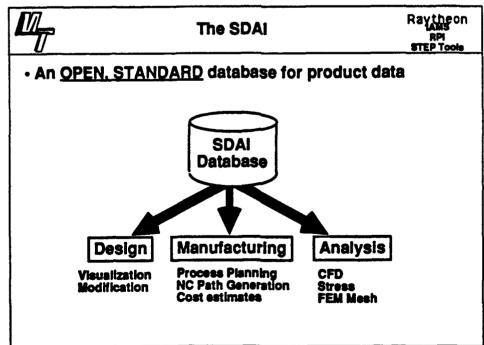
Roger Burkhart, Deere Frank Demasek, EDS David Briggs, Boeing Steve Clark, NIST John Halbert, PAFEC Rob Howard, British Aerospace

others

22do 1

IPPI IRB 10/15/93

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IPPI IRB 10/15/93

19/25/96 4:2

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Requirements

Raytheon AMS RPI STEP Tools

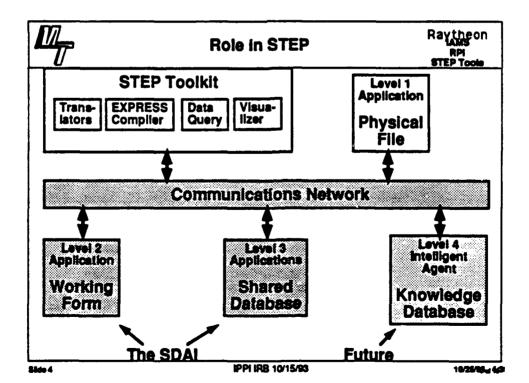
- Let applications access databases of STEP data.
- CAD style concurrency.
- EXPRESS driven (applies to all STEP models)
- Early and late binding
- Database = (data dictionary + data instances)
- Define path to STEP data that works for any database

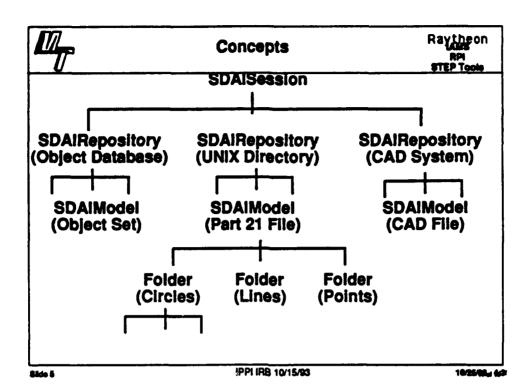
relational, file, OO and CAD system specific

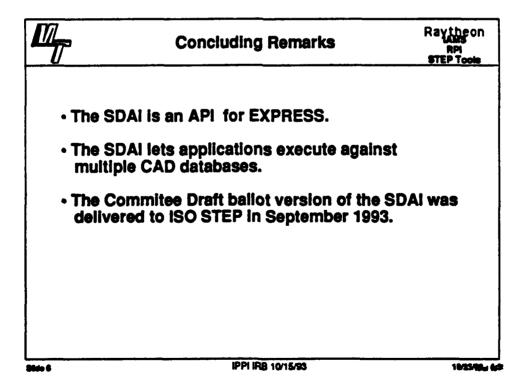
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IPPI IRB 10/15/93

19/25/99 4:2







Using PDES/STEP to Implement CONCURRENT ENGINEERING

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Matt Dinmore
Jochen Fritz
Tom Liberty

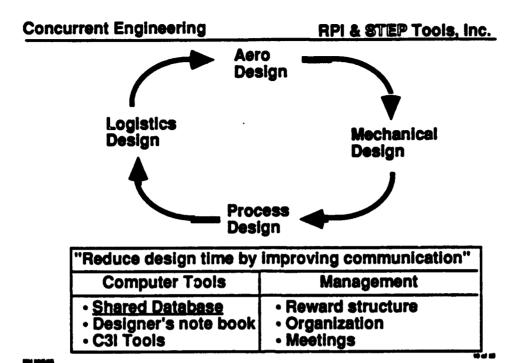
Partially funded by the DARPA initiative in Concurrent Engineering (DICE)

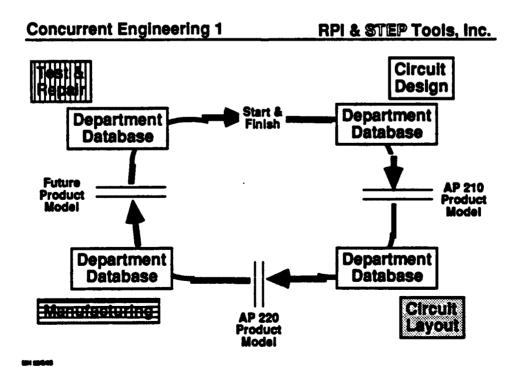
Overview

RPI & STEP Tools, Inc.

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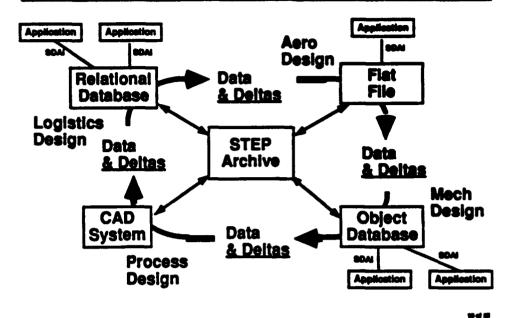
- Using STEP to implement concurrent engineering
- Extensions to the standard





Concurrent Engineering 2

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Delta Files

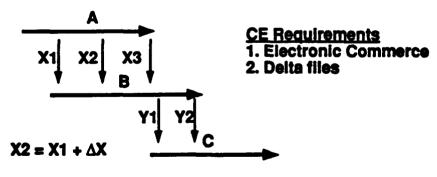
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A

B

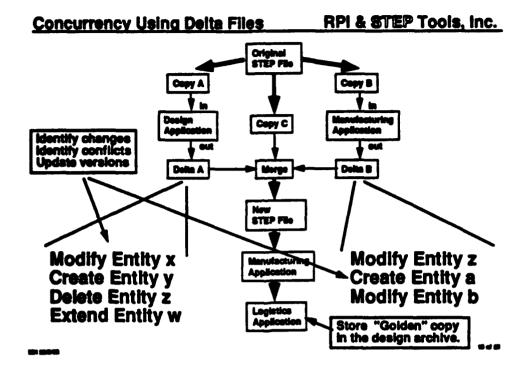
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Serial Engineering



Concurrent Engineering

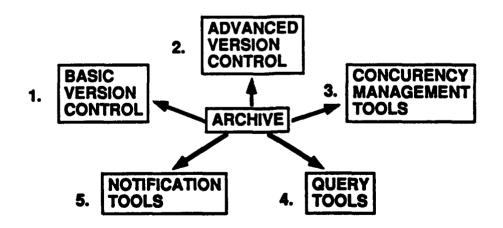
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SECS/CE

RPI & STEP Tools, inc.

"STEP Entity Control System for Concurrent Engineering"

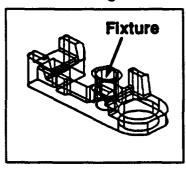


Funded by the DARPA initiative in Concurrent Engineering (DICE)

Demonstration

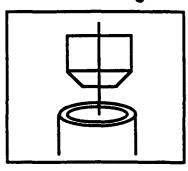
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Part Design



ACIS on a SUN

Fixture Design



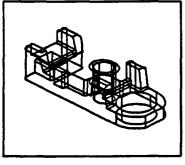
CATIA on a RS/600

V1 and V2

RPI & STEP Tools, Inc.

Highlighted Changes

Part Design



ACIS on a SUN



CATIA on a RS/600

- Using STEP to implement concurrent engineering
- Extensions to the standard

Delta file standards

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845

1. An identity standard

So that we know when two entity instances describe different versions of the same thing.

2. A file format that understands the identity standard

So that we can exchange data without loosing identity.

3. A delta file Application Protocol

So that all applications can process engineering changes.

4. New SDAI Operations

So that delta files can be computed and applied.

RPI & STEP Tools, Inc.

New SDA! Operations

- Diff function to compute the difference between two SDAI models.
- Sed function to apply a diff to an SDAI model

and optionally

 Conflict function to analyze the quality of a diff with respect to an SDAI model

Diff

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 Produces a change record for each difference between two files.

Edit attribute value of instance Delete instance Create instance Add type to instance Delete type from instance

- <Edit, OID, attribute_name, new_value>
- <Delete, OID>
- <Create, OID>
- <Add type, OID, type>
- <Delete type, OID>
- Format of the change record may need to be agreed with a future "change control" AP.

- · Sed applies a file of change records to an SDAImodel
- If a record does not make sense for a model
 (for example the instance to be edit has been deleted)
 then Sed ignores this record and moves on.

Conflict

RPI & STEP Tools, Inc.

 Analyzes the quality of a delta file with respect to an SDAI model

or with respect to an SDAI model and another delta file

Can produce

List of records that will not do anything List of records that change the same entity instance

User Interface Issues

- Identifying and resolving conflicts requires user intervention
- This means the conflicts must be presented to the user in a form that he or she can understand
- For example, an edit to the center of a circle must be presented to the user as a change to the circle not a change to the point.
- In other words changes to the AIM entities must be presented to the user as change to ARM entities

Conclusion

RPI & STEP Tools, Inc.

- STEP is a key technology for concurrent engineering
- Support for delta files should be added to STEP
- This requires

a standard for identity an AP for change control SDAI support for computing and applying diffs support for Views so that conflicts are meaningful



Implementing AP Inter-Operability using STEP-VIEWS

Dr. Martin Hardwick RPI & STEP Tools, Inc. hardwick@steptools.com

Partially funded by the DARPA initiative in Concurrent Engineering (DICE)

-

Overview

STEP Tools, Inc

- Applications of STEP-VIEWS
- EXPRESS-V A View Definition Language (input to Version 2 of EXPRESS)
- SDAI-V A View Definition Architecture (input to Version 2 of the SDAI)

STEP-VIEWS = EXPRESS-V + SDAI-V

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STEP-VIEWS contribute towards

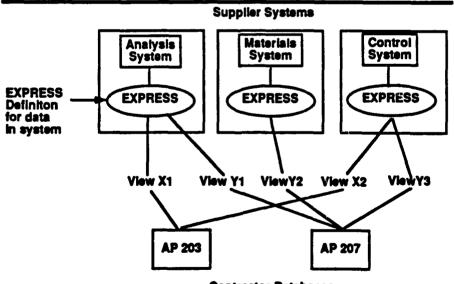
- AP inter-operability
- Making STEP more affordable
- Making STEP easier to understand

WARE

AP Interoperability

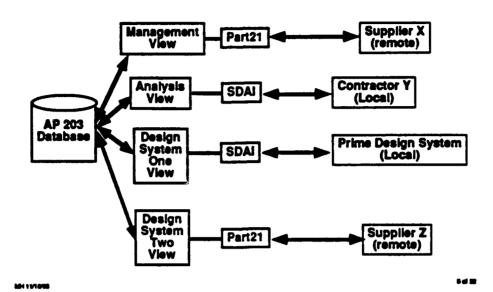
STEP Tools, inc

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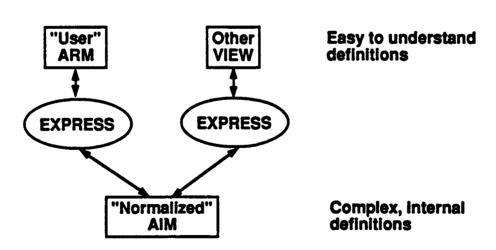
Contractor Databases

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Making STEP easier to understand

STEP Tools, Inc



- Do not loose accuracy or completeness of STEP
- Make it possible for a tool vendor to implement one interface to multiple AP's
- Make it possible for AIM entities to be mapped into ARM entities.
- Allow a common model to be computed from many AP models

MH 191000

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...

Goals

-

STEP Tools, inc

- To meet the requirements given the STEP-VIEWS must be able to
 - select the entities to appear in a view
 - simplify the definition of those entities when desirable

```
(* cube defined in the normal way using EXPRESS *)
 ENTITY cube:
 x: REAL:
                           Cube is simple, block
 y: REAL:
 z: REAL;
                            is complicated - see Part 42
 size: REAL:
 END ENTITY:
 (* Cube defined to be an view entity for block using SVDL *)
 VIEW block AS cube
 WHEN block.x = block.y AND block.y = block.z;
 x := block.position.location.coordinates[1]; (* local origin *)
 y := block.position.location.coordinates[2];
 z := block.position.location.coordinates[3];
 size := block.x:
 END_VIEW;
                                                         MI 1910TO
 Illustration
                                          STEP Tools, inc
                            EXPRESS-V
                             Formulas
          Base
                                                View
        Instances
                                              Instances
       SDAI
                                                 SDAI
```

Database

Database

```
VIEW <base entity> AS <view entity> WHEN <condition_on_base_entity>; <attribute> := <expression>; * (* other features not yet described *) END_VIEW;
```

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Some Refinements

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**

VIEW <entity_a> AND <entity_b> AS <view_entity>

the view entity is contructed from two base entities (similar to joins in relational databases)

VIEW <entity_a>:<name_b>

the base entity is used twice and renamed at each occurence (similar to SQL)

VIEW <entity_a>;

the base entity is copied into the VIEW as is

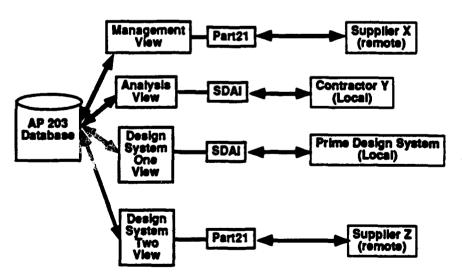
- An architecture is needed to describe how applications can use views
- The architecture must be compatible with long transactions

-

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Long transactions

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14 of 22

 One approach might be to compute view updates by inversing the view definition as in relational databases.

Advantage- the user only has to describe how the View is constructed

Disadvantage- View updates are a problem in relational databases for complex views.

 Our approach is to ask the user to describe an algorithm to implement the view update.

-

Updates

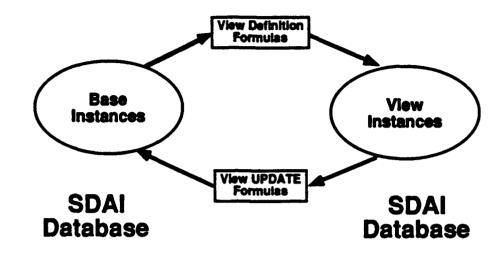
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```
VIEW cube OF block
WHEN block.x = block.y AND block.y = block.z;
(* view attribute definitions previously shown *)

UPDATE
block.position.location.coordinates[1] := x;
block.position.location.coordinates[2] := y;
block.position.location.coordinates[3] := z;
block.x := size;
block.y := size;
block.z := size;
coordinates[3] := z;
block.z := size;
block.z := size;
block.z := size;
```

-

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SDAI-V Algorithm

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STEP Tools, inc

- 1. A private copy is made of a set of entity instances.
- 2. A set of view instances is created from the instances selected in Step 1.
- 3. An application or user edits the view instances for a (possibly) extended period of time.
- 4. The new values of the view instances are used to update the instances selected in the Step 1.
- 5. The view instances are deleted.
- 6. The instances copied in STEP 1 are merged back into the database.

- The VIEW database creates or deletes entity instances
 see enhancements on next slide
- The UPDATE formulas cause side effects on each other

user responsibility to make the formulas side effect free

The base entities may be locked for a long time
 a good version control mechanism is need in STEP

Creating and Deleting Instances

STEP Tools, inc

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VIEW block as cube

WHEN block.x = block.y AND block.y = block.z;..
(* Definition and Update formulas not shown *)

CREATE

101111000

block.position := axis2_placement; block.position.axis := direction([0.0,0.0,1.0]); block.position.ref_direction := direction([1.0,0.0,0.0]); block.position.location := cartesian_point ([0.0, 0.0, 0.0])

DELETE

block.position.location; block.position.ref_direction; block.position.axis; block.position; block; END_VIEW;

-

- Update, Create and Delete blocks may need to be conditional
- For example, to create a product version instance in AP 203 it may be necessary to create a product instance first.

CREATE WHEN SIZEOF (QUERY (t <* product | TRUE)) = 0 (* code to create the product instance *)

• Error conditions may be raised.

BNF Outline

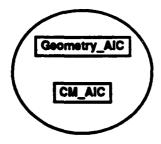
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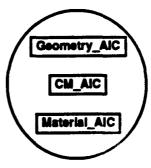
Application Interpreted Constructs

STEP Tools, Inc

AP 203



AP 207



AIC's are "standard" partitions of the AP's

-

AIC's and STEP-VIEWS

STEP Tools, Inc

- AIC's make views easier to define
- Views do not need AIC's.
- · Views can be used when AIC's are not available.
- Views do not have to be defined by STEP.
- Views are a solution to AIM to ARM problems.
- Views and AIC's make STEP easier to implement

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STEP-VIEWS facitificates

AP inter-operability
More affordable STEP interfaces for suppliers
Model sharing between AP's
Easier to understand interfaces

· We have presented

EXPRESS-V to select and simplify instances SDAI-V to support long transactions

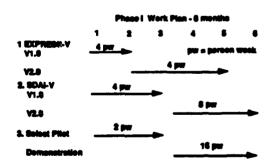
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Schedule

STEP Tools, inc

Goal: Demonstrate Viability of Concept



36 Weeks Total

26 Weeks = STEP Tools Class II Membership

B3. STEP Software for World-wide Manufacturing

ARPA Market Study — Appendix

STEP Software for World-wide Manufacturing

Martin Hardwick hazdwick@steptools.com

STEP Tools, Inc 100 Jordan Road Rensselaer Technology Park Troy, NY 12180

-

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Overview

STEP Tools, Inc.

- Why STEP
- Software products for STEP

STEP Software for World-wide Manufacturing

Martin Hardwick hardwick@steptools.com

STEP Tools, Inc 100 Jordan Road Rensselaer Technology Park Troy, NY 12180

1014000

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Overview

STEP Tools, Inc.

- Why STEP
- Software products for STEP

-

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STEP Tools, Inc.

- An information modeling language called EXPRESS
- A methodolgy for creating product models
- Product models in place or under development for

Configuration Controlled Design (AP 203) Associative Draughting (AP 202) Sheet Metal Die Design (AP 207) Circuit Assembly Design (AP 210) many others

Methods to access EXPRESS data in files and databases

Why STEP

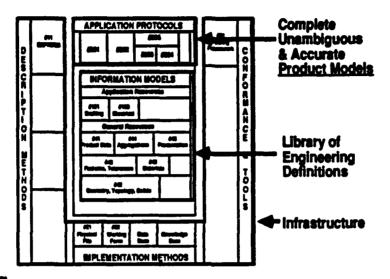
STEP Tools, Inc.

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- Better communication
- Better databases
- Reduced design times

• STEP is international, modular and extensible.



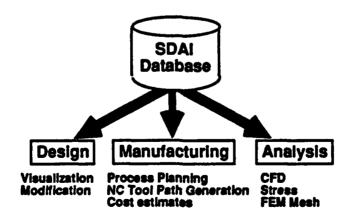
Better Databases

STEP Tools, inc.

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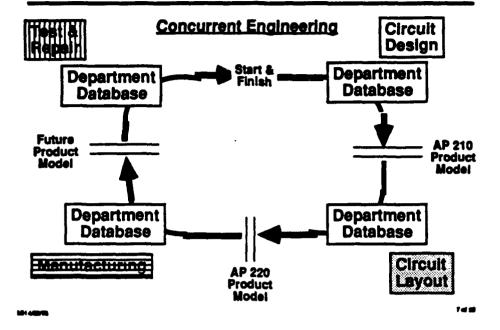
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- The CAD system of choice changes every 5 years
- · Products can last for 30 years



Reduced Design Times

STEP Tools, Inc.



STEP Software

STEP Tools, Inc.

- Information Modeling Tools
- Application Development Tools
- Database Management Tools

STEP Tools, Inc.

ST-EXPRESS

Reasons to buy

STEP Tools, inc.

-

- EXPRESS is a great way to model technical data
- EXPRESS is system and technology independent
- EXPRESS can help you understand the information requirements of your enterprise
- EXPRESS can help you plan your new systems and understand your old ones.
- EXPRESS has been used by STEP, CFI, POSC and others

- Tools to help you understand EXPRESS models
- Tools to help you verify EXPRESS models
- Tools to test your models
- Tools to develop new models

ST-EXPRESS

STEP Tools, Inc.

1148

- An EXPRESS compiler
- An EXPRESS interpreter
- An EXPRESS to EXPRESS-G translator
- A instance editor and checker

Use the EXPRESS compiler:

t expfront -c AP_schem.exp

ENTITY Stree; An Entity de also: INTEGER; rect: RociNode; e record END_ENTITY;	fines
ENTITY Node ABSTRACT SUPERTYPE: keys : SET (0:7] OF STRING(5); WHERE WHERE keys not ascending: keysArsAscending (keys); END_ENTITY;	RE defines a traint
pointere:SET [0:7] OF internalNode; parent:Stree; WHERE node is an orphan; parent root a: SELF:	itance tion call

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Create EXPRESS-G

STEP Tools, Inc.

Put the EXPRESS file through the layout tool:

t express2expg AP_schema.exp

View the result with the EXPRESS-G display tool:

t express-g AP_scheme-expg

Browse, rearrange, and print the EXPRESS-G diagrams.

Availability

STEP Tools, inc.

• MS Windows platforms Q1 of 1994

Application Development Tools

-

STEP Tools, Inc.

-

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ST-DEVELOPER

(The STEP Programmers Tool Kit)

STEP Tools, Inc.

Reasons to buy

- You need to exchange data between CAD systems
- You want to link an application to a STEP database
- · You want to write a new CAD application
- You need a custom application for STEP or EXPRESS

What you need

STEP Tools, inc.

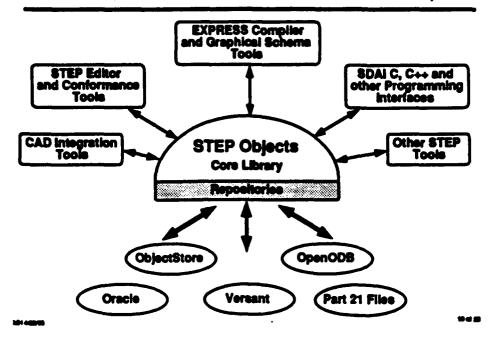
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- Maximum programmer productivity
- Full, reliable, comprehensive coverage of EXPRESS, Part 21 and the SDAI
- Modularity and flexibility
- Built-in database management
- Interfaces to IGES, DXF and other standards
- Built in support for a wide range of CAD systems

ST-DEVELOPER

STEP Tools, Inc.



Projects

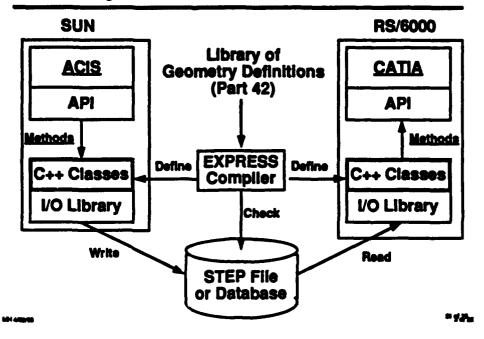
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- WP AFB Geometry Database project for F15, F16 & AF22 aircraft geometries.
- Integrated Process Planning Initiative (IPPI)
- PreAmp SDAI database for circuit boards (AP 210).
- Raytheon MO DB for electrical manufacturing data.
- Rapid Response Manufacturing.
- GM and Boeing UG/CGS/CATIA Sheet Metal Project.
- Unigraphics AP 203 interface for the STEP 777 project
- CTC CALS EXPO 93 demo
- Rolis Royce, Applicon, and 80 others in the US, Germany, Japan, UK, Spain and Scandanavia.

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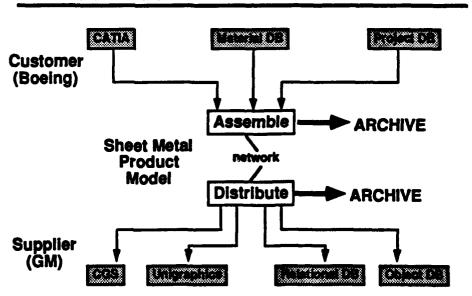


STEP Tools, Inc.

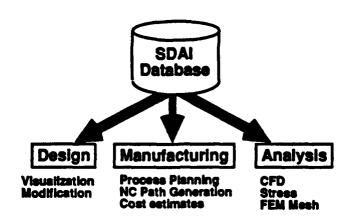


Electronic Commerce

STEP Tools, Inc.



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Availability

STEP Tools, inc.

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• UNIX workstations since December 1991

ST-203

1014000

Reasons to buy

STEP Tools, Inc.

- You need an archive of AP 203 descriptionss for your customers and suppliers
- You need to convert to AP 203
- You need to be able to verify the correctness of your AP 203 data sets
- You need to be able to repair AP 203 data

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STEP Tools, inc.

- An archive
- An AP 203 visualizer and data editor
- IGES to AP 203 translation and data entry
- Test and repair tools

Availability

STEP Tools, Inc.

- Silicon Graphics and SUN platforms Q1 1994
- Other platforms as Open GL becomes available
- Demonstrations at AUTOFACT and CALS EXPO

C. Detailed Description of CFI DR 1.0

ARPA Market Study — Appendix

Detailed Description of CFI DR 1.0

This is a detailed description of the Information Model developed by CFI to represent the hierarchical netlist connectivity of electronic circuits. One of CFI's goals it to represent more aspects of circuit structure in the future.

The Information Model has been partitioned into two sections. The first section is the "Base Object Model", and the second is the "Base Connectivity Model". The "Base Object Model" captures the top of the entity hierarchy used to describe the information model (see Figure 1). The "Base Connectivity Model" represents a high-level abstraction of the base connectivity model for electronic circuits.

Description of the Base Object Model

The entire Design Representation Information Model is derived from a single entity which models the basic, low-level behavior of any entity in the model. This low-level behavior is intended to capture the essence of the notion of an OBJECT. The basic behavior of all objects in the DR model is that they will be TYPED and may have an optional list of properties associated with them. Additionally, many objects have a NAME.

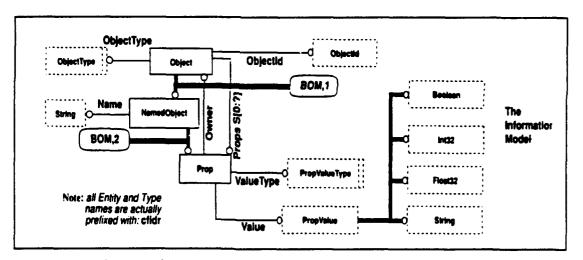


Figure 1. Base Object Model

The Base Connectivity Model Description

This section describes the portion of the model that represents hierarchical netlist connectivity. The EXPRESS-G diagram of the Base Connectivity Model is shown in Figure 2. This model represents the objects and relationships used to represent hierarchical netlists with bundles in CFI 1.0.0 Design Representation.

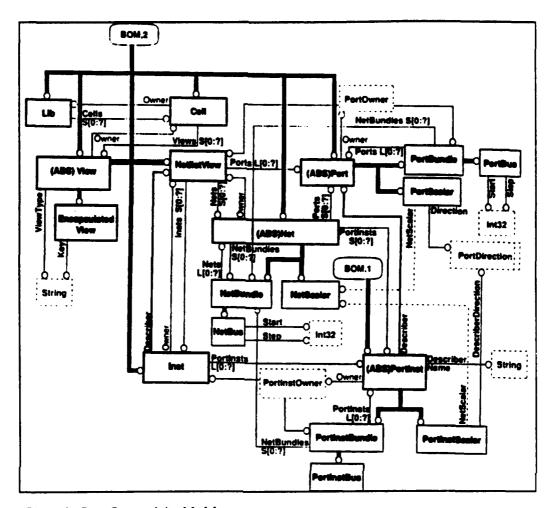


Figure 2. Base Connectivity Model

Hierarchical design supports the notion of building up the behavior of a design by collection and connecting together other designs. Each of the other designs can in turn be built recursively from yet other designs, etc., until a subdesign is reached which is composed of primitive design elements. In this case a primitive design element is one for which no further interior structure is known. Primitive design elements are also referred to as leaf cells.

In order to represent a hierarchical design, there must be a way to represent the design under consideration and the fact that it is composed of other designs which are connected in some way. In the model described herein, a particular implementation of a design is represented by the **NetlistView** entity. The inclusion of smaller designs of which a NetlistView is composed are represented by then **Inst** entity. The term **Inst** is an abbreviation for the word **Instance**.

Instantiation is the act of using one design in the structure of another design. In this model, the design which is being used is the Inst, and the design in which an Inst is used is the NetlistView. An example of this could be the NetlistView as a Printed circuit board and an Inst as an individual chip which is soldered down onto the circuit board. A NetlistView may have more than one Inst within it and

multiple Insts of a single design may be placed into the NetlistView. An Inst represents the use of one design within another design. Each Inst represents an instantiation of one NetlistView within another NetlistView.

An instantiation is not exactly a copy nor is it exactly a symbolic reference. For example, in a NetlistView named "Half-Adder" an Inst of a NetlistView names "XOR" represents the fact that the design of an XOR gate is used as a component in the design of a half-adder.

Having provided a representation for the hierarchical structure of designs using the NetlistView and Inst entities, it is necessary next to provide a representation for interconnecting the Insts within a NetlistView.

The connectors of a design are represented by the Port entity. Since an Inst represents the use of a specific NetlistView, the PortInsts belonging to an Inst correspond exactly to the Ports on the NetlistView referenced by the Inst. For example, if an Inst "XOR1" represents the use of an XOR gate within a design then each of that Inst's PortInst entities will correspond to a single Port entity in the NetlistView of the XOR gate that was used to create this Inst. The correspondence between an Inst and the NetlistView it represents is referred to as the "Describer Relationship". An Inst is completely "described" by the NetlistView it represents. This same correspondence exists between a PortInst and the Port it represents. Both the Inst and PortInst entities contain a Describer attribute. The fact that PortInst's attributes for name and direction are DescriberName and DescriberDirection indicate the close tie required between each PortInst and its Describer Port.

To complete the initial model, the Net entity is used to represent each set of connections between PortInsts and Ports within a NetlistView. When a collection of PortInst and Port entities are associated with a Net, it reflects the intention that each PortInst and Port in the collection will have exactly the same signal information at all times. A Net may connect only PortInsts, only Ports, or a mixture of the two.

One final concept is that of **Bundles**. In many scenarios, it is convenient for a designer to group a set of signals together and refer to the set as a single signal. In the Base Connectivity Model, this concept is represented by introducing the notions of **Scalar**, **Bundle**, and **Bus**. A Scalar is an individual thing which may not be unbundled into anything else. A Bundle is an ordered collection and a Bus is an ordered collection with index values for each position. The idea of Scalar, Bundle, and Bus is applied to Nets, Ports, and PortInsts.

A Net may be either a NetScalar, a NetBundle, or a NetBus. In a sense, there are now three "types" of Net entities. A NetScalar entity represents one individual signal which may not be further decomposed into subsignals. A NetBundle entity is a collection of Nets, each of which is optionally a NetScalar, a NetBundle, or a NetBus. A NetBus entity is a NetBundle with tow additional attributes of Start and Step which define the range of index values associated with the positions in the bundle.

Thus NetBundles have only the Names for each Net and an implicit Position in the bundle for each Net. NetBusses are NetBundles that also have an index

value for each position. This index is restricted to be monotonically changing from position to position by a fixed integer Step, that can be positive or negative, but may Start at any integer value.

NetBundles do not hide the Names of their member nets. All Nets in any one NetlistView are required to have unique names. Nets can appear in more than one position in a given bundle and in more than one NetBundle. A given name for a Net in a particular NetlistView always refers to the exact same Net.

A similar structure exists for Ports and PortInsts, resulting in the definition of PortScalar, PortBundle, PortBus, PortInstScalar, PortInstBundle, and PortInstBus. The PortInstBundles and PortInstBusses get their structure entirely from the corresponding PortBundles and PortBusses.

However, a significant difference from NetBundles is that PortBundles hide the Names of their members from other PortBundle contents and from the names of the Ports that are directly in the NetlistView. Thus Port Names may be reused without referring to the same object. The other difference is that a PortBundle, and thus also a PortInstBundle, cannot repeat a member in two different positions. Therefore any one name only appears one time in a given bundle.

DIE Information Exchange (DIE) Format Reference Manual D. (Chapter 1)

ARPA Market Study — Appendix

IC Manufacturer to MCM Designer Die Information Exchange (DIE) Format Reference Manual

VERSION: 0.8 (DRAFT)
24 August, 1993

Please check the Notes for Reviewers section behind the Table of Contents

DIE Format Industry Group

(for more information, email a request to die-info@vhdl.org)

VERSION: 0.8 Draft

Prepared by:

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This document represents work in progress under funding from the ARPA/ESTO ASEM program under contract MDA972-93-C 0002 (nCHIP subcontract 240-01). Its distribution is made purely for the purposes of comment and industry feedback during the development phase of the contract.

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DIE Format Reference Manual

Bare Die Library

Notes for Reviewers

reh, 24 aug 93 (draft 0.8)

Italicized sections in this document, or phrases enclosed in curly braces {}, represent notes to the reviewer about unclear areas or discussions still not finalized. They should not be considered part of the final document.

Some of the drawings contained herein are based on original electronic work by TI as part of their HDI process description; and further modified by MCC as part of the Design Interface Alliance.

Not all settings have been defined yet. All level 0 ones are, most level 1 and some level 2. They will be completed by the draft release before the workshop.

The Thermal and Electrical models have not been integrated into this draft document as of yet. See separate companion documents describing the proposed models.

TAB or Flip die are not yet included in this description. The current settings should not preclude and should definitely support their inclusion.

A thorough review with experts in all IC process technologies has not been completed yet. Some technologies such as GaAs, ECL or BiCMOS may not yet be properly covered.

Although we have tried to be very careful to consistently use terms, the terms we picked may not be appropriate or correct for the technology (for example, we should possibly use "literal" instead of "value", etc.). Please suggest clearer or more appropriate terminology (even if seemingly trivial) as needed. Being buried in it, we sometimes miss the basic items.

This document, many referenced documents, and related information is all available via the VHDL International Internet Repository. You can get access and download files in many ways. Each is described next:

Email access:

There is an email FTP archive server on the machine. Send an email message to archive@vhdl.org. The subject is ignored. If a line in the body of the message begins with "help", then a descriptive help file of commands available is sent. Basically, you communicate to the server through commands in the mail message body. It then responds to your commands via email. You should always add the command "path <your_email_address>" to any message to assure the return address is understood.

The following examples assume you have initiated a mail message to archive@vhdl.org. They list the contents (or body) the email message should contain. Remember to use "path <your_email_address>" also.

For example:

path randyh@lmc.com

To get Help:

help

To get a listing of the available files and

directories at a given level:

and a description of each:

index pub/die

send pub die/00readme -- note: those are leading zero's

To ask for a file to be downloaded:

send pub die/die0-8/die0-8.eps

Dial-Up access:

Dial-up the vhdl.org system at 408.945.4170. Any baud (upto 14,400), parity, start & stop bits, and v.* settings will do. Login as "guest" account. Once in, simple UNIX commands such as "cd pub/die", "ls" and "cat" are available. Also, you can download desired files using "kermit", "xmodem" or "sz" (zmodem).

Internet access:

Use "fip vhdl.org" (or "fip 198.31.14.3") and log in as user anonymous. Also, gopher is available and highly recommended if you have it available. Gopher to "vhdl.org". Remember to set "binary" mode for any binary files you may select.

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VERSION: 0.8 Draft

1. Introduction

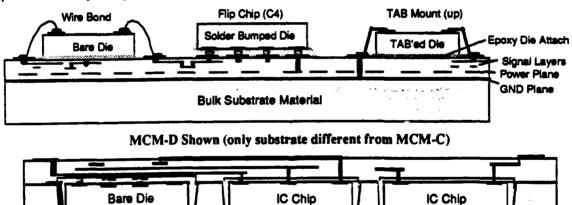
This document is the result of a study and workshop into the design practices and technologies of MCM and IC manufacturers, designers and EDA tools. It represents the data requirements that have been extracted by key companies and people in the industry that were used as the basis to form an interchange specification for die library information. See [REQUIRE] and [WORKSHOP] for more details.

The DIE Format is designed to be a computer sensible (EDA tool processable) interchange format for information from IC manufacturers to MCM designers and foundries. The format is not intended to be an Electronic Data Book nor to necessarily represent all the information needed to understand the die. In some cases, information important to the end user but not computer sensible has been included to facilitate understanding and use of the data.

The DIE Format is intended to convey the physical characteristics of the die -- those needed for place & route, thermal analysis, electrical signal analysis, power distribution design, and physical bonding. Other existing formats are expected to incorporate the functional, test, and inherent timing information.

The primary focus has been on digital IC's but the format is eventually meant to include all components used in an MCM process. (ICs, passive devices, connectors, etc.) Information that is time consuming to manually collect, difficult to enter, or not generally available has a priority for inclusion. Information specific about the bare die form of a component generally falls into this category.

Specifically included are pre-diced die, bare die, and die that have been post-processed for attachment mechanisms such as flip chip (Solder bump, C4, etc.), wire bond, TAB (flexible lead frame direct attach to die), and chips first (chip in cavity, embedded chip, etc.; under thin film interconnection). These various forms of die and there use are shown diagrammatically in figure 1. In this first release, TAB has not been covered nor flip chip with solder bumps or extra thin-film layers added.



Chips First (High Density Interconnect) Shown

Substrate

Figure 1: Typical MCM Die Attach and Pad Bonding Mechanisms

This format represents an interim solution to exchanging bare die information. The resulting information model crudely defined by this document will be used to further refine more comprehensive standards. Specifically, it is expected to help drive the EIA EDIF [EIA548] and CFI CIR (Pinnacles) Electronic Data Book format (syntactically represented using [SGML8879]) emerging standards. A final standard from CFI or EIA is not expected to be ratified before 1996.

Whatever the final standard, the interim format is kept simple so as to make easy availability of a translator capable of taking DIE Format blocks and converting them into any final standard that develops. In this way, IC manufacturers who start delivering to the format today are guaranteed of a long commitment to the format into the future. Also, consideration is given to generating a block from a GDS II file. This, along with the human readability of the format, should make it easy for IC manufacturers to create the necessary file block info about

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their die. Given EDA vendors are committed to adopting the format as it exists today, this should further enhance the usefulness of this interim solution.

The specifics of the format itself are broken up into three major sections. First a top down structure of the data, and other lexical information about the format is described. Then the compliance levels with the settings are introduced. Finally, the core of the format, the settings are described in a reference style format for easy look-up. The first two section's should be read for an overview, followed by a detailed reading of each setting in the final section. Following the settings are a glossary, reference list, and appendices giving detail in a collected format (for example, the BNF).

1.1. Basic Model

- The DIE Format is designed to convey information about bare die in a convenient, succinct manner suitable for EDA tool processing and MCM designer consumption, where needed. Post-processed die which have TAB, ribbon, or solder bumps added to the bare die are considered special, modified forms of the die and as such, receive their own section of description. These special forms of still unpackaged die reference will still need to reference the bare die information for a majority of the detail.
- Many times information is common across many die or many objects being described on the die such as interface pads. In these cases, the format allows for the separate definition of the information and objects and then the instancing of the object with any necessary "local" customization given at that time. This is similar to how the TAB die actually reference the bare die and then proceed to describe the differences or "added" objects.
- From here on out, when die is used unannotated in the this document, it implies bare die. All other form of die 20 (such as flip die, TAB die, etc.) will be identified as such. The generic term for all these various types of die is unpackaged die.
 - For TAB die, the pads are defined to be the contact point areas of the lead frame -- sometimes termed the Outer Lead Bond (OLB). The lead frame is broken up into three sections -- the Inner Lead Bond (ILB), the connecting tape, and the OLB.
- Note the for ribbon die which to be mounted face down (flip), the OLB will be interior compared to the connecting tape. This is due to the action taken of cutting off it shortening the leads during bonding.

Datum and coordinate system

Geometrical figures are defined in a two-dimensional, Euclidean view plane. The geometrical figure is formed by an orthographic parallel project. From the die to the view plane. The view plane is parallel to and above the plane formed by the die active surface. The outside surface closest to the electrically active layers of material defines the "top" of the die. This outer, "top" layer is typically coated with an electrically passive material and thus termed the "passivation layer".

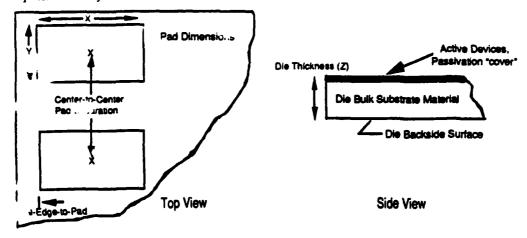


Figure 2: Miscellaneous Die and Pad Specifications

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The die coordinate system origin is defined at the center of the smallest rectangle which will bound the die's view plane. A "rotation" orientation of the die is arbitrary but must be consistently applied. The bonding pad diagram is usually a useful visual aid to establishing for the user the orientation of the die in the view plane.

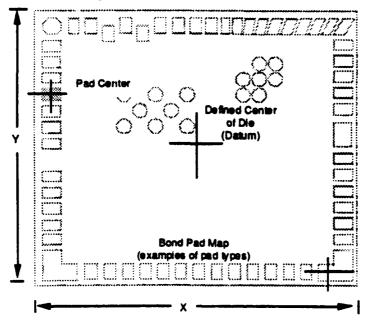


Figure 3: Die and Pad Datum (centers),
Pad outliss and placement examples

Similarly, a pad's coordinate system origin is defined to be the center of the smallest rectangle which will bound the pad. For level 0 pad geometry's, a pad ... defined as the smallest passivation opening over the metal contact of an intended connect point.

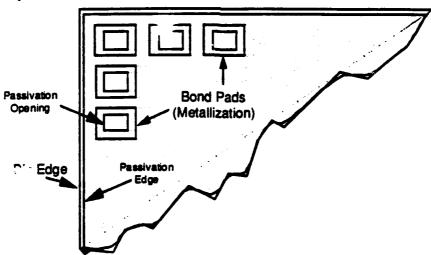


Figure 4: Miscellaneous Die and Pad Specifications

10 Tolerances and Accuracy

A physical dimension, such as a width, height or thickness, has both a basic dimension value and a tolerance. The basic dimension is defined to be the numerical value used to describe the theoretical size of an object. It is the basis (or datum) from which the tolerances and accuracy are defined. Tolerances specify the minimum or maximum expected deviation from a given theoretical dimension for the physical structure being described.

The tolerance for a physical dimension or coordinate point is given by a separate setting attribute. If not defined for the section, then the tolerance is unknown. The tolerance represents the deviation in the physical object from the basis.

Each numeric value has a precision and an accuracy. The precision is represented by the number of numeric digits used to represent the value. The accuracy is, by default, plus or minus 1/2 of the least, non-zero digit radix. That is, if the last non-zero digit radix is 10^{-3} , then the accuracy is \pm .0005. When creating a block in the DIE format, the appropriate precision to imply an accuracy that is close to the intended value should be used for all values. The accuracy represents the deviation possible in the numeric value due to measurement, computing or other forms of introduced errors; but not the tolerance of a value to represent a physical item.

Note that an accuracy of other than 1/2 a digit cannot be specified (although a tolerance for a dimension can be more specific).

1.2. BNF Conventions

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Throughout the rest of the document, the syntax of the DIE Format is introduced using BNF. The conventions are briefly covered here for those readers unfamiliar with this format.

A definition is shown starting with a non-terminal of the item being defined followed by a '::=' sequence and then the body of the definition. A definition may span .nultiple lines of the document.

```
<Non_terminal_definition> ::= <body>
```

A non-terminal is shown between angle brackets ('<' and '>'). A terminal is a keyword or special character shown in **boldface** type and between single quotes if only a single character.

```
<non_terminal>
terminal_such_as_keyword
'1'
```

When zero or one occurrences of an item or group of items can exist, the item(s) are grouped within square brackets ('[' and ']'). When zero, one or more occurrences of an item or group of items can occur, they are grouped within curly braces ('[' and ']'). One or more occurrences are defined by putting the item(s) first and then again inside curly braces. When a fixed number of items, a fixed number range of items, or a fixed minimum number of items is required; this is represented by putting the items in curly braces followed immediately by the number or range designation (n, n-m, or n+; respectively).

```
Zero or One Occurrences: [ <body> ]
Zero, One or More Occurrences: { <body> }
One or More Occurrences: <body> { <body> }
```

Sometimes there is the possibility of a choice between several different items. Each item may be a single name value or a complex non-terminal. When there is an option or choice between a list of different items, the items are separated by a vertical pipe (") character. All items between two vertical pipes are part of the same choice. All items between the definition start and the first vertical pipe are part of the first choice. All items after the last vertical pipe to the end of the definition comprise the last choice.

```
<choice_definition_example> ::= <1> <2> <3> | <x> <y> | <a> <b> <c> <d><</pre>
```

Items may be grouped into a sub-definition to avoid creating a nested definition. If an option is being defined, the grouping defines the beginning and end of the definition. The grouping is indicated by enclosing the items in parenthesis ('(' and ')').

```
::= ... <item> ( <1> <2> <3> | <x> <y> | <a> ... ) <item> ... which is in lieu of doing a reference to another non-terminal: ::= ... <item> <choice_definition_example> <item> ...
```

Non-terminals shown in the syntax that are {tokens or lexicons or literals} of the language are described in the lexical conventions section presented later on.

E. ASEM CAx Interface Specification Alliance Program Plan and Roadmap

ASEM CAx Interface Specification Alliance

Program Plan and Roadmap Working Document

Contract Line Item No. 0001 Data Item A011

Contract # F33615-92-C-1134

July 1993

Microelectronics and Computer Technology Corporation 12100 Technology Boulevard Austin, Texas 78727

Contact: Dr. Kenneth Drake 512-250-2764 drake@mcc.com

1.3 Objective Statements

The following are the key objectives which this Alliance will accomplish in fulfillment of its mission.

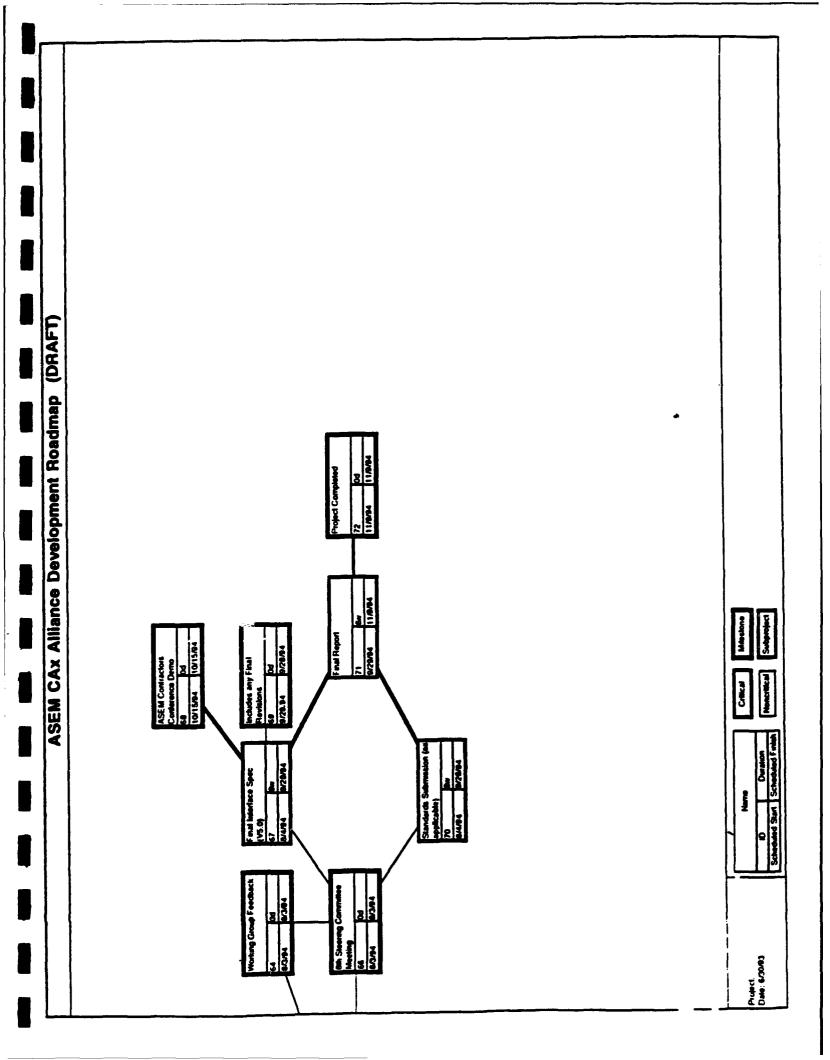
- The Alliance will define, develop, and disseminate a comprehensive set of ASEM information and data exchange interface specifications for the bi-directional flow between the design environment and multiple manufacturers (open foundries).
 - Existing standards will be exploited to the fullest extent possible and recommendations made for their extensions to accommodate any unique requirements for ASEMs.
 - Any new candidates for a standard will be prepared for submission to the appropriate standards group.
 - Focus will initially be on the exchange of physical level design information, progressing upward in the design flow as deemed necessary later in the program.

1.4 Plan-of-Action

MCC, as the Alliance facilitator, has defined a five step approach to accomplish the mission of the program. These basic steps are as follows:

- Establish Program organization, industry/government Steering Committee, and roadmap.
- Define a working model of the ASEM design information/data flow, PRIORITIZE, and partition it into logical interfaces.
- Hold industry review session, staff werking groups with experts to address specific interfaces, develop interface specification documents, and exercise and validate those interface specifications.
- Review and seek approval from Alliance members (revise as needed).
- Determine applicable standards for the exchange of ASEM design data, identify any modifications and/or make recommendations for new standards.

These steps are incorporated into this document and form the basis of the roadmap (PERT chart) included in section 2.0.



John Isaac (Mentor G.)
Kevyn Salsburg (IBM)
Frank Boyle (Cadence)
Lou Concha (WL)
Tony Mazzullo (Harris)

Randy Harr (Logic Modeling)
Dave Zarnow (Hughes)
Don Kuk (Intergraph)
Wes Hansford (ISI)

The responsibilities of the steering committee include the following:

- Provide overall executive direction for the Program.
- Determine priority of interfaces and appropriate subcommittees (working groups).
- Help recruit appropriate individuals for working groups.
- Monitor the working groups to ensure focus and progress.

2.3 Roadmap (PERT Chart)

Based on the recommendations and requirements established by the steering committee over the past four months a PERT chart was generated based on the schedule of events and milestones needed to meet the mission statement of this program. The PERT chart was generated based on the definition of working groups recommended by the steering committee. Refer to section 4.0 for Working Group mission statements. This PERT chart accommodates the requirements of the validation pilot project working group as needed to exercise and support the working groups defining the actual interface specifications. The PERT charts are comprised of the following four pages.

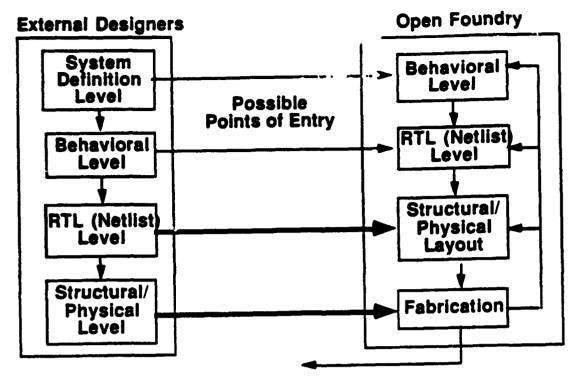


Figure 3-2 There will be multiple entry points from an external customer to an ASEM foundry.

A more detailed analysis of the foundry interface was provided by Texas Instruments and Motorola with additional reviews and comments by the other steering committee members. The view at this more detailed entry level is shown in Figure 3-3. This illustrates the relationship of external customer design flow with the entry into the foundry's internal design flow. The bidirectional exchange of information is essential for the complete and accurate design of ASEMs. Hence, the early design information from the foundry to the external customers must be defined concurrently with the flow of electrical design, layout, and packaging information from the external design to the foundry.

The interdependencies on the bi-directional flow of information made it expected difficult to define the working groups which will work explicitly to determine the various interfaces at each exchange level. The type of information required is also dependent on the point of entry into the design flow. The steering committee decided to partition the problem into topics which represent the flow of information and recommended that the working groups should be defined accordingly. Note that the nomenclature used below was selected to refer to the direction of the data exchange and will be used throughout this document to describe the topic matter of the working groups. The problem was partitioned as follows:

- 1) Customer-to-Foundry: That information which is produced by the customer from both the CAD environment and from other descriptive information that is required by the foundry to produce an ASEM.
- 2) Foundry-to-Customer: That information which a foundry must provide a customer to select and design, with the appropriate technology, an ASEM which meets the customer's application requirements.
- 3) IC Physical Description: That information required by both the customer and the foundry to complete the physical and electrical design of an ASEM.

An example of the type of design information is shown in Figure 3-4.

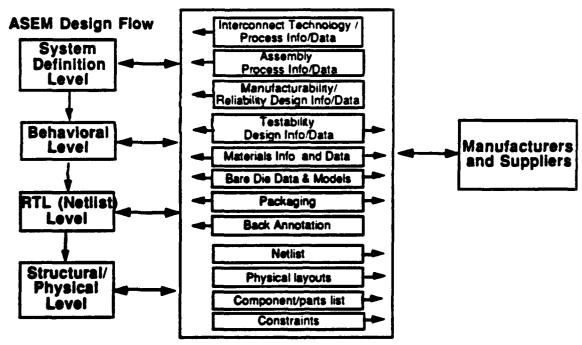


Figure 3-4 ASEM design data types and direction of design information/data flow.

The Customer to Foundry Working Group will also publicize our activities to other standards groups (CFI, IGES Harmonization, PAP/E, EDIF, VHDL), and to the industry in conjunction with industry meetings (IEPS in San Diego in September '93 and the IPC meeting in Washington, D.C. in October '93.)

The Working Group will also review the IC Draft prepared by the IC Data Specification and Interface Working Group.

4.2 Foundry-to-Customer Working Group Mission (Chairperson: Kevyn Salsburg)

Objective: To define, through industry consensus, interface specifications leading toward the standardization of the exchange of data from MCM foundries to the ASEM CAE/CAD environment. This data shall include:

- delivery files
- design kits
- feedback information following data transfer from customer to foundry
- technology rules

The working group will add information to the MCC draft specification which:

- 1) defines what information will be given back to the customer following an exchange of design data from the customer to the foundry, and
- 2) defines the format of that information so that the same type of information is provided to the customer independent of which foundry was used.

A data model of the content of design kits will be coordinated through the information modeling working group.

The first focus of this group will be directed at information and data needed to ensure the success of physical design level data.

4.3 IC Data and Interface Specification Working Group Mission (Chairperson: Randy Harr)

Objective: To identify, develop, and refine interface specifications that are essential for the exchange of IC related physical design information needed as part of the design data interface

complexity of the validation exercises and to have well defined demonstrable milestones each six months.

5.0 Industry Review Process

Factored into the program's plan of action are specific steps to ensure the review and acceptance by industry of the interface specification standards. As shown in the program PERT chart, there are planned industry participations, reviews and presentations over the next 18 months. Key to the success of the industry consensus process is the staffing of working groups by industry, representing the interests of end-users (customers), EDA vendors, IC manufacturers, suppliers, and ASEM manufacturers.

Working group chairpersons and MCC will ensure the recruiting of volunteer participants in the industry review process. These working groups are chartered with the missions listed in Section 4.0 above. The review process must be formalized so that information is captured and presented for industry review in a well organized model. A procedural approach to analyze and describe the information and data interfaces will be followed for each interface level, using a common information language called EXPRESS. EXPRESS is an object oriented, "Pascal-like," language used to capture information in a common descriptive format (textual, graphical, physical, process, etc). The use of EXPRESS is extremely important because, first, it provides a well-defined characterization of the information received or generated at each interface level. This is a sufficient prerequisite to allow EDA vendors to provide design automation tools and to allow definition of the foundry interface. Second, it is important to both government and industry that the information description allows industry to act early with the interface specifications and not wait for them to become an accepted standard.

6.0 Standards

The Alliance does not intend to create a new standard, but to leverage from existing standards and determine a standard method and approach in applying these standards to standardized on how data and information is most easily exchanged from the design environment to the foundry for manufacture. As recommended by the steering committee, in the near term this standard will be comprised of multiple industry-accepted data formats for physical layout with augmented files such as for text and test data. In the long term, the Alliance will work with other standards groups such

```
* Copyright 1993, Microelscl. cs and Computer Technology Corporation
                         Al ...hts reserved
          ***********
                                *******
SCHEMA asem;
3NTITY Property;
       name: STRING:
      `value: STRING;
SND_ENTITY;
ENTITY Laver
       SUBTYPE OF (DbObject);
       lyr: INTEGER;
END_ENTITY;
ENTITY Point
       SUBTYPE OF (DbObject);
       x: REAL;
       y: REAL;
END_ENTITY;
ENTITY BBX
       SUBTYPE OF (DbObject);
       ll: Point;
       ur: Point;
END_ENTITY;
ENTITY Line
       SUBTYPE OF (DbObject);
        lyr: Layer;
       nPath: INTEGER;
        path: LIST OF Point;
END ENTITY;
ENTITY Path
        SUBTYPE OF (DbObject);
       beginExt: REAL;
        endExt: REAL;
        lyr: Layer;
        netNum: INTEGER;
        nPath: INTEGER;
        path: LIST OF Point;
        pathShape: STRING;
        width: REAL;
```

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***** j

ENTITY Rectangle
SUBTYPE OF (DbObject);
bBox: BBx;
lyr: Layer;
END_ENTITY;

END_ENTITY;

```
justify: STRING;
        labelType: STRING;
        lyr: Layer;
        orient: STRING,
        angle: REAL;
        theLabel: STRING;
        xy: Point;
 ND_ENTITY;
ENTITY compidentText
        SUBTYPE OF (Label);
 ND ENTITY:
 NTITY Cell
        SUPERTYPE OF (ONEOF ( via, Padstack, Package,
                              chipReference, Fiducial, chipBondPads, bondPad,
                              connectorPad, connector))
        SUBTYPE OF (DbObject);
        blockName: STRING;
        cellType: STRING;
        objList: LIST OF DbObject;
 ND ENTITY;
 NTITY diePhysicalDimensions
        SUBTYPE OF (DbObject);
        chipUnits: REAL;
        x: REAL:
        xTolerance: REAL;
        y: REAL;
        yTolerance: REAL;
        padShape: STRING;
        padCenterlinetoDieCenterline: REAL;
        padCenterlinetoDieCenterlineTolerance: REAL;
        dieThickness: REAL;
        dieThicknessTolerance: REAL;
        minimumDieFeatureSize: REAL;
        minimumDieFeatureSizeTolerance: REAL;
IND_ENTITY;
ENTITY bondPadMap
        SUBTYPE OF (DbObject);
        pinOut: LIST OF PadstackOccurrence;
        pinsSkipped: LIST OF PadstackOccurrence;
        xOpeningSize: REAL;
        yOpeningSize: REAL;
END ENTITY;
INTITY dieBackSide
        SUBTYPE OF (DbObject);
        materialType: STRING;
        materialThickness: REAL;
        surfaceFinish: STRING;
        electricalPotential: STRING;
        minimumBiasVoltage: REAL;
        votageUnits: REAL;
        minimumBiasCurrent: REAL;
        currentUnits: REAL;
SND ENTITY;
ENTITY dieOperatingTemperature
        SUBTYPE OF (DbObject);
        minimumAllowed: REAL;
        maximumAllowed: REAL;
```

```
processLimits: physicalProcessLimitations;
        CriticalConditions: dieCriticalConditions;
        protectiveLayer: topProtectiveLayer;
        padMetal: diePadMetal;
        attachMaterial: dieAttach;
        handlingLimitations: LIST OF STRING;
        assemblyProtectedAreas: LIST OF Polygon;
        lidSeal: dieLidSeal;
END ENTITY:
ENTITY wireBondedDie
        SUBTYPE OF (Chip);
        bondWireSize: REAL;
        sizeUnits: REAL;
        downBonds: INTEGER:
END_ENTITY;
ENTITY TABFrameMap
        SUBTYPE OF (DbObject);
        xDimension: REAL;
        yDimension: REAL;
        lengthunits: REAL;
        electricalPotential: REAL;
        potentialunits: REAL;
        pinList: LIST OF PadstackOccurrence;
END_ENTITY;
ENTITY TABbedDie
        SUBTYPE OF (Chip);
        outline: STRING;
        frameMap: TABPrameMap;
        partMap: Occurrence;
        leadframeCoatingMaterial: Material;
        leadFrameCoatingRemoval: LIST OF STRING;
END_ENTITY;
ENTITY dieBumps
        SUBTYPE OF (DbObject);
        location: LIST OF Point:
        centerToCenter: REAL;
        tolerance: REAL;
        lengthUnits: REAL;
        xbump: REAL;
        yBump: REAL;
        closestToEdgeDistance: REAL;
        func: LIST OF STRING;
        minimumBumpToActiveDistance: REAL;
End_entity;
ENTITY FlipChipDie
        SUBTYPE OF (Chip);
        bumps: dieBumps;
        protectiveCoating: Material;
        protectiveCoatingRemoval: LIST OF STRING;
END_ENTITY;
ENTITY Occurrence
        SUPERTYPE OF (ONEOF ( viaOccurrence, PadstackOccurrence,
                              viaHoleOccurrence, viaPadOccurrence,
                              PackageOccurrence, chipReferenceOccurrence,
                              FiducialOccurrence, chipBondPadsOccurrence,
```

```
END_ENTITY;
        ENTITY bondPad
                SUBTYPE OF (Cell);
                name: STRING;
        END_ENTITY;
        ENTITY bondPadOccurrence
                SUBTYPE OF (Occurrence);
               name: STRING;
       END_ENTITY;
       ENTITY, chipBondPads
               SUBTYPE OF (Cell);
               name: STRING;
       END_ENTITY;
      ENTITY chipBondPadsOccurrence
              SUBTYPE OF (Occurrence);
              name: STRING;
      END_ENTITY;
     ENTITY connector
             SUBTYPE OF (Cell);
             name: STRING;
    END_ENTITY;
    ENTITY connectorOccurrence
            SUBTYPE OF (Occurrence);
            name: STRING;
    END_ENTITY;
    ENTITY connectorPad
           SUBTYPE OF (Cell);
           name: STRING;
   END_ENTITY;
   ENTITY connectorPadOccurrence
           SUBTYPE OF (Occurrence);
           name: STRING;
   END_ENTITY;
  ENTITY viaHole
          SUBTYPE OF (DbObject);
          shape: DbObject;
          name: STRING;
 END_ENTITY;
 ENTITY ViaPad
         SUBTYPE OF (DbObject);
         shape: DbObject;
         name: STRING;
END_ENTITY;
ENTITY ViaHoleOccurrence
        SUBTYPE OF (Occurrence);
        master: STRING;
        xy: Point;
        rotation: STRING;
        uname: STRING;
END_ENTITY;
```

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	Foundry Interface Specification Developed	8	······		•		••••					******		
	2.1 1st Major Industry Review Meeting	8	•••••	-				•				*****		
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California

Project Date: 8/26/80

Market Study Telemarketing Survey F.

EDA DICE Market Study Telemarketing Program F1.

ARPA Market Study — Appendix

EDA

DICE MARKET STUDY TELEMARKETING PROGRAM

NAM	E: MR./MS
TITL	E:
COM	IPANY:
ADD	RESS:
CITY	: ST: ZIP:
TELE	EPHONE:
supp study desig the s	I morning/afternoon this is from Marketing Support Services. I am calling in ort of a study sponsored by the ARPA, Advanced Research Projects Agency. This is collecting information on concurrent engineering software for multichip module in. Your input is very important to us as the information gathered will be included in tudy. This study will be distributed to ARPA and made available to a wide range of rnment agencies. This survey can be done anonymously.
May	I please have a few minutes of your time to ask these survey questions?
YES	NO - May I call you back at a more convenient time?
Than	k you.
1.	Are you currently utilizing, or planning to use in the future, Multichip Module Technology?
	1. CURRENTLY USING -(Go to ques 3) 2. THE FUTURE-(Go to ques 4)
	3. NOT USING -(Go to ques 2)
2.	Is there someone else in your organization that may be using, or considering using MCM technology?
	YES -(Get name and telephone number, ask to be transferred)
	NO -(Terminate call)

		COMMENTS
A. DESIGN	51	
B. SUBSTRATE FABRICATION	82	
C. ASSEMBLY	53	
D. TEST	84	
E. DESIGN SOFTWARE	55	
F. ENGINEERING SUPPORT	56	
G. CONSULTING SERVICES	57	
		manufacturing are you expecting to be
		COMMENTS
A. DESIGN	58	
B. SUBSTRATE FABRICATION	59	
C. ASSEMBLY	60	
D. TEST	61	· · · · · · · · · · · · · · · · · · ·
E. DESIGN SOFTWARE		
E. DESIGN SOFTWARE	@	
F. ENGINEERING SUPPORT	es	

In which phases of MCM design or manufacturing are you involved?

3.

	IMP	SAT	COMMENTS
A. DESIGN		1	
B. SUBSTRATE FABRICATION		2	
C. ASSEMBLY		3	
D. TEST			·
E. DESIGN SOFTWARE		5	
F. ENGINEERING SUPPORT	•		
G. CONSULTING SERVICES6. Which of the following MCN	technolog	² ies are y	you planning to use in the future
	f technolog	ies are y	you planning to use in the future
6. Which of the following MCM	-	ies are y	you planning to use in the future
6. Which of the following MCM A. MCM-L LAMINATE B. MCM-C CERAMIC THICK FILM C. MCM-C CERAMIC LOW	65	ies are y	you planning to use in the future' COMMENTS
6. Which of the following MCM A. MCM-L LAMINATE B. MCM-C CERAMIC	65	ies are y	you planning to use in the future' COMMENTS
6. Which of the following MCM A. MCM-L LAMINATE B. MCM-C CERAMIC THICK FILM C. MCM-C CERAMIC LOW TEMPERATURE COFIRED D. MCM-D THIN FILM	65 66	ies are y	you planning to use in the future' COMMENTS

On a scale of 0 to 10 with 0 indicating not important or not satisfied, and 10 indicating very important or very satisfied, how would you expect to rate the

5.

satisfaction of the following of	ategories i	ed how would you rate the importance and in which you are utilizing MCM technology: licated "IN USE" in ques 3)
	IMP	SAT COMMENTS
A. DESIGN		
B. SUBSTRATE FABRICATION		
C. ASSEMBLY		10
D. TEST		11
E. DESIGN SOFTWARE		12
F. ENGINEERING SUPPORT		13
G. CONSULTING SERVICES		14
	•	es are you currently using, or are planning
8. Which of the following MCM	technologi	es are you currently using, or are planning
8. Which of the following MCM	•	es are you currently using, or are planning
8. Which of the following MCM to use in the future?	•	es are you currently using, or are planning FUTURE COMMENTS
8. Which of the following MCM to use in the future?A. MCM-L LAMINATEB. MCM-C CERAMIC	•	es are you currently using, or are planning FUTURE COMMENTS 15
8. Which of the following MCM to use in the future? A. MCM-L LAMINATE B. MCM-C CERAMIC THICK FILM C. MCM-C CERAMIC LOW	•	es are you currently using, or are planning FUTURE COMMENTS 1516
8. Which of the following MCM to use in the future? A. MCM-L LAMINATE B. MCM-C CERAMIC THICK FILM C. MCM-C CERAMIC LOW TEMPERATURE COFIRED D. MCM-D THIN FILM	IN USE	es are you currently using, or are planning FUTURE COMMENTS

On a scale of 0 to 10 with 0 indicating not important or not satisfied, and 10

7.

9.	What design tools do you environment?	currenti	y use, o	r plan	to use,	in you	design
A. FO	OR CAE	72					
B. FC	OR CAD	73					
C. FC	OR CAM	74			. 		
	OR YOUR OVERALL RONMENT & FRAMEWORK	75			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
10.	Please rate the following is MCM's.	ssues rela	ative to th	e desiç	gn and	manufaci	turing of
		IMP	SAT (COMMI	ENTS		
	SIGN AUTOMATION WARE		20				
DESI	IE INTEGRATION OF YOUR GN TOOLS MCM DESIGN		21				
TRAN	ANDARDS FOR DATA ISFER BETWEEN GN AND MANUFACTURER		2				
	CESS TO CHIP & PONENT DATA		23				
METH	OWLEDGE OF DESIGN HODOLOGIES TO EMENT MCM'S	-	24				
	TOMATED TESTING & LITY METHODS		25		·		

11. Using the same 0 to 10 scale	e, please	rate the	following capabilities?
	IMP	SAT	COMMENTS
A. AN ENVIRONMENT WHICH ALLOWS THE OPEN, BI-DIRECTIONAL TRANSLATION OF DATA FROM ONE DESIGN SYSTEM TO ANOTHER			26
B.THE CAPABILITY TO DESIGN AN MCM ON TWO DIFFERENT DESIGN SYSTEMS SIMULTANEOUSLY, FOR EXAMPLE AUTOROUTING, THERMAL ANALYSIS, & MANUFACTURING DOCUMENTATION			
C.THE CAPABILITY TO MOVE DESIGNS AND DATA AMONG SIMILAR APPLICATIONS FROM DIFFERENT EDA VENDOR			26
D.THE CAPABILITY OF STORING THE MCM DATA IN NEUTRAL FILE FORMAT RATHER THAN AN EDA VENDORS NATIVE FORMAT			29
E.THAT EACH SOFTWARE APPLICATION IS BEST IN ITS CLASS			
F.THAT ALL OR MOST OF THE SOFTWARE USED IN YOUR ENVIRONMENT BE PURCHASED FROM A SINGLE VENDOR			n

12.	Please rate the following MCM design environmen	t?		·	s of an
		IMP	SAT COM	MENTS	
A.S	STEM SPECIFICATIONS				
B.S	STEM PARTITIONING		n		
C.Al	JTOROUTING		¥		
	ACKAGING TECHNOLOGY ECTION				
FOU	JPPORT OF MCM NDRIES WITH IGN KITS		×		
	TIMIZATION OF IUFACTURING DATA		37		
13.	Does your company use	CONCURRE	NT ENGINEER	RING?	
	1. YES - (Go to ques 16))	2. NO -(Go to ques 17)	
	3. NOT SURE -(Go to qu	ies 14)			
14.	Our definition of "CONCU	IRRENT EN	GINEERING" is	:	
	"Concurrent Engineering design automation systems engineering team when optimal product design	tems that p re team me	romote and s mbers work i	upport a multi-disc n parallel to comp	iplined
15.	How closely does your systems match the concu				
	1. VERY CLOSELY	2. CLOSE	LY	3. SOMEWHAT	
	4. NOT AT ALL	5. OTHER:			

16.	In your opinion, how important is inv your concurrent engineering requirer			
	1. EXTREMELY IMPORTANT	T	2.	VERY IMPORTANT
	3. IMPORTANT		4.	NOT IMPORTANT
17.	In selecting an MCM manufactories	cturer, plea	ase rate	the following factors on the 0 to 10
		IMP	SAT	COMMENTS
DESI	E AVAILABILITY OF GN KITS FROM THE UFACTURER OR EDA VENDO	OR.	s	
REPL	E MCM MANUFACTURES ITATION, EXPERIENCE, CK RECORD.		3	•
	E TECHNOLOGY OFFERED HE MANUFACTURER		4	0
	CURRING COST OF DUCTION		4	1
	GINEERING SUPPORT CONSULTING		4	2
18.	Using the same scale please			•
		IMP	SAT	COMMENTS
A.CAI (CFI)	D FRAMEWORK INITIATIVE	***************************************	4	3
B.STE	EP/PDES	~	4	·
C.IGE	S		4	5
D.EDI	F		4	ß
E.IPC	-350		4	7
F.GEF	RBER		4	B
G.GD	SII STREAM		4	·
H.DXF	:		5)

ank you very u would like t	much Mr./Ms o make regarding l	for your time. Do you have any final commen MCM technology?
YES	NO	
		
*******	*****	*************************
OMMENTS:		
•		

F2. Marketing Survey List

Marketing Survey List

1.	MOSIS Organizer Engineering Manager
	USC - ISI - MOSIS
	Marina Del Ray, CA
2.	Consultant
	IBM
	South Bend, IN
3.	Anonymous #1
4.	Anonymous #2
5.	Anonymous #3
6.	Manager Micro Electronics & Communication Technical Program
	Martin Marietta
	Syracuse, NY
7.	Sr. Member Technical Staff
	Texas Instruments
	Dallas, TX
8.	Advanced Manufacturing Speciliast
	Acustar
	Huntsville, AL
9.	Qualcomm
10.	Digital Equipment Corporation Merrimack, NH
	Merrimack, NH

Marketing Survey List

11.	Senior Software Engineer Raytheon CAE Operations Tewksbury, MA
12.	CAD Support Mayo Clinic Rochester, MN
13.	VP Products/Services H Chip Inc San Jose, CA
14.	Manager/Advanced Pkg. Technologies ERIM Ann Arbor, Mi
15.	Drafting Supervisor Micro Networks Worchester, MA
16.	Harris Government Aerospace Systems Division
17.	Harris Cemiconductor
18.	Eastman Kodak
19.	Motorola
20.	Hayes Microcomputer Products

Marketing Survey List

21.	Hughes
22.	Raytheon
23.	Charles Draper Labs
24.	Interchip systems Inc.
 25.	SMI Electronics
26.	Motorola
27 .	Litton Amecon
 28.	Raytheon

F3. Basic Statistics

Basic Statistics

The pages aa-bb contain the numerical analysis performed by the Telemarketing group.

A summary of the statistics is contained on the following pages.

CON ULL MARK, STUDY JANT, J. ATTS. L. SURVEY PERIOD 9312 - ALL RESPONSES OF ENDING

C A 1 E G G R V	QUE \$710M	RESPONSES	HEAN	MEAN SAT	HEAN
O1-COMSIDERING NCW TECH.	01-05A-DESIGM 04-05D-7EST 05-05E-DESIGM SOFTWARE 06-05F-ENGINEERING SUPPORT 07-05G-CONSULTING SERVICES	Мамая	00000	60000	
02-UTFLEZING MCM TECHMOLOGY	08-07A-DESIGN 09-07B-SUBSTRATE FABRICATION 10-07C-ASSEMBLY 11-07D-1EST 12-07E-DESIGN SOFTWARE 15-07F-ENGINEERING SUPPORT 14-07G-CONSULTING SERVICES	7 4 1 4 7 0 8	M 4 8 4 P M 8	*******	
OA-DESIGN/MFG OF MCM'S	20-10A-DESIGN AUTOMATION SOFTWARE 21-10B-INTEGRATION OF DESIGN TOOLS FOR HEM 22-10C-STANDARDS DATA TRANSFER-DESIGN/HFG 23-10D-ACCESS TO CNIP & COMPONENT DATA 24-10E-DESIGN HETHODS TO IMPLEMENT HEM'S 25-10F-AUTOMATED TESTING & QUALITY HETHODS	* 4 * * * * * * * * * * * * * * * * * *	****	******	*****
05-CAPABILITIES	26-11A-BI-DIRECTIONAL TRANSLATION OF DATA 27-116-DESIGN NCN ON 2 DIF SYS SINUL. 28-11C-NOVE DES/DATA ANONG SINILAR APPL. 29-11D-STORE NCN DATA IN NEUTRAL FILE FRNT 30-11E-EA SOFTWARE APPL. BEST IN 11S CLASS 31-11F-NOST S/W PURCHASED FROM ONE VENDOR	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	8447	40444	4244
D6-MCM DESIGN ENVIRONMENT	32-12A-SYSTEM SPECIFICATIONS 33-12B-SYSTEM PARTITIONING 34-12C-AUTOROUTING 35-12D-PACKAGING TECHNOLOGY SELECTION 36-12E-SUPPORT MCM FOUNDRIES W/DESIGN KITS 37-12F-OPTIMIZATION OF MANUFACTURING DATA	8 = N = = 8 = N N N N =	*****	*****	******
07-SELECTING NCM NFG	30-17A-DESIGN KITS AVAIL. FROM HFG/VENDDR 39-17B-MFG REPUTATION/EXPERIENCE/RECORD 40-17E-TECHNOLOGY OFFERED BY MANAFACTURER 41-17D-RECURRING COST OF PRODUCTION 42-17E-ENGINEERING SUPPORT & CONSULTING	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	****		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
08-DATA EXCHANGE STANDARDS	43-18A-CAD FRANCHORK INITIATINVE (CFI) 44-18B-STEP/PDES 45-18C-1GES 46-18D-EDIF 47-18E-IPC-350 48-18F-GERBER 49-18G-GDSII STREAH	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	*******	******	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

COA DICE MARKET STUDY SURVEY STATISTICS SURVEY PERIOD 9312 - ALL RESPONSES BY QUESTION GAP INDEX = 1.74

69:25 HONDAY, DECEMBER 6, 1993

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SAT	7.3 6.9 0.5
HEAR	7.3
RESPONSES	2.1
=	-Dxf
QUESTION	30-10H-DX
CATEGORY	08-DATA EXCHANGE STANDARDS

CDA DICE MARKET STUDY SURVEY STATISTICS SURVEY PERIOD 9312 - ALL RESPONSES RAMKED BY DESCENDING IMPORTANCE GAP INDEX = 1.74

COMPANIES WITCH: CO-030-05516W Companies with TCCH. COMPANIES Companies with TCCH. Co-030-05516W Companies with TCCH. Co-030-05516W Companies with TCCH. Co-030-05516W Companies with TCCH. Co-030-05516W Co-030-055	CATEGORY	QUEST10N	RESPONSES	X	MEAN SAT	1 L D I	
TOURS DEFINE WENT TOTAL	1				,		
COMPRIGNEME WITH TICH. 0-05-1631	Ĭ	01-05A-0FSIGX	~	70.0	0 .	• •	
100 100	-CONSIDERING NCH TECH	04-050-1651	-	10.0	٥. ٥	٥. ٥	
Comparison for the controllery	-CONSIDERING NCH	05-05E-DESIGN SOFTWARE		10.0	9.0	0.7	
The control of the	-CONSIDERING NCM	DSF-ENGINEERING	-	10.0	•	2.0	
	*	- 1	•	•	• •	3.0	
	2-UTILIZING MCH		07	4.6	7.5	1.9	
	A-DESIGN/NFG OF	HUH.	22	9.4	0.	1.3	
DESIGNANTS OF NEWS. 22-100-57ANDARDS DAIA INANSTED CESSIONARS 23-100-57ANDARDS DAIA INANSTED CESSIONARS 24-100-57ANDARDS DAIA INANSTED CESSIONARS 25-1100-57ANDARDS DAIA INANSTED CESSIONARS 25-1100		08-07A-0ESIGN	=	9.3	7.6	1.1	
-EELECTHING MCM NCG ST.210C-STANDANDS DATA INANGER-DESIGN/NCG ST.210C-STANDANDS 21 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		23-100-ACCESS TO CHIP & COMPONENT DATA	2.3	9.3	5.1	1.1	
Facility Figh Fig	5	22-10C-STANDARDS DATA TRANSFER-DESIGN/NFG	2.4	9.2	6.0	3.2	
	2	39-178-HFG REPUTATION/EXPERIENCE/RECORD	12	• •	7.1	7.0	
	HCH	10-07C-ASSEXBLY	12	•	•	• •	
	HCH	٥	1.2	•	7.6	1.2	
DESIGNAMED BY NEW PARTY 29-107-NUTDANTION SOTTHANE 25 0.7 6.4 9-126-106-106-106-106-106-106-106-106-106-10	***	12-07E-DESIGN SOFTWARE	11	1.1	6.9	• · ·	
	5	4 DUALITY	2.2		• •	2.3	
	5	20-10A-DESIGN AUTOMATION SOFTWARE	2.5	• •	6.9	1.6	
		34-12C-AUTOROUTING	23	• •	7.2	1.3	
-SELECTING MEN MIG. -SELECTING MEN MIG. -SELECTING MEN MIG. -SELECTING MEN MEN. -SELECTING MEN. -SELECT	DESIGN	0	7.7	•	6.2	2.1	
	07-SELECTING NCM MFG	A1-170-RECURRING COST OF PRODUCTION	20	•	8.8	3.2	
	-UTILITING MCH	13-07f-ENGINEERING SUPPORT	19	6.3	٧.٧	•.0	
	5	21-108-INTEGRATION OF DESIGN TOOLS FOR MCM	7.7	8 .8	•	1.9	
	ENVINORMEN	32-12A-SYSTEM SPECIFICATIONS	19	8.2	• •	1.6	
-CAPBILITIES -CAPB	DESIGN		19	1.1	9.9	2.2	
-CAPABILITIESCAPAB	07-SELECTING MCM MFG	42-176-ENGINGERING SUPPORT & CONSULTING	2.1	1.1	•.	1.1	
	05-CAPABILITIES	DAT	23	•	• •	4 .8	
-DATA EXCHANGE STANDARDS	OG-MCM DESIGN ENVIRONMENT	33-128-SYSTEM PARTITIONING	11	o .	• · •	2 . 2	
	EXCHANGE	40-107-6E#6E#	23	•	7.1	6.0	
-ACAPABILITIES 21 7.0 4.9 -CAPABILITIES 22 17.7 4.4 -CAPABILITIES 23 17.7 4.4 -CAPABILITIES 23 17.7 4.4 -CAPABILITIES 24 17.7 4.9 -CAPABILITIES 24 17.7 6.9 -CAPABILITIES 25.1 1.1 1.2 CLASS 24 17.7 5.7 -CAPABILITIES 25.1 1.1 1.2 CLASS 25 1.3 5.9 -CAPABILITIES 25.1 1.1 1.2 CLASS 26.9 -CAPABILITIES 25.1 1.1 1.2 CLASS 26.9 -CAPABILITIES 25.1 1.1 1.2 CLASS 27.1 1.3 6.9 -CAPABILITIES 27.1 1.2 CLASS 27.1 1.3 CLASS	DE-DATA EXCHANGE STANDANDS		2.2	•	1.5	9.0	
-CAPABILITIES 29-11D-STORE MCM DATA IN MEUTRAL FILE FRMT 23 7.7 4.4 CAPABILITIES 20-11E-EA SCTIWARE APPL. BEST IN ITS CLASS 24 7.7 5.7 6.9 CA-18D-EDD-EDD-EDD-EDD-EDD-EDD-EDD-EDD-EDD-E	OG-NCM DESIGN ENVIRONMENT	36-12E-SUPPORT MCM FOUNDRIES W/DESIGN KITS	21	7.8	• •	2.9	
-CAPABILITIES 30-11E-EA SOFIMARE APPL. BEST IN ITS CLASS 24 7.7 6.9 -DATA EXCHANGE STANDARDS 46-18D-ED15 -LOTA EXCHANGE STANDARDS 46-18D-ED16 -LOTA EXCHANGE STANDARDS 49-18E-IPC 20 7.3 6.9 -CAPABILITIES 20-11C-MOVE DES/DATA ANONG SIMILAR APPL. 23 7.1 4.7 -CAPABILITIES 27-118-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 -UTILIZING MEM TECHNOLOGY 14-07G-EOMSULTING SERVICES 12 6.8 7.0DATA EXCHANGE STANDARDS 43-18A-CAP FRANEWORK INITIATINYE (CFI) 20 6.8 4.9 -DATA EXCHANGE SIANDARDS 44-18B-STEP/POES 14 6.0 7.0DATA EXCHANGE SIANDARDS 47-18E-IPC-350 -CAPABILITIES 31-NDARDS 47-18E-IPC-350 -CAPABILITIES 31-11F-MOST S/W PURCHASED FROM ONE VENDOR 22 5.2 6.4	05-CAPABILITIES	29-110-STORE MEM DATA IN MEUTRAL FILE FRMT	22	7.7	* . *	3.S	
-DATA EXCHANGE STANDARDS 46-18D-EDIF -DATA EXCHANGE STANDARDS 46-18D-EDIF -SELECTING NCW MFG -SELECTING NCW		. BEST IN ITS CLAS	5	1.1	•.•	•	
-SELECTING NEW MFG 30-17A-DESIGN KITS AVAIL. FROM MFG/VENDOR -DATA EXCHANGE STAMDARDS 45-18C-1GES -DATA EXCHANGE STAMDARDS 50-18H-DXF -CAPABILITIES 20-11C-MOVE DES/DATA AMONG SIMILAR APPL. 23 7.1 4.7 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 5.3 27-11B-DESIGN MEM ON 2 DIF SYS SIMUL. 21 7.0 7.0 21 7.0			22	7.7	5.7	2 · 0	
-UATA EXCHANGE STAMDARDS 45-18C-1GCS -DATA EXCHANGE STAMDARDS 90-18M-DXF -CAPABILITIES 20-11C-MOVE DES/DATA ANONG SIMILAR APPL. 23 7.1 4.7 -CAPABILITIES 27-11B-DESIGN MCM 0M 2 DIF SYS SIMUL. 21 7.0 5.3 -UATA EXCHANGE STAMDARDS 44-18B-STEP/PDES 45-18B-STEP/PDES 44-18B-STEP/PDES 11 6.0 7.0		KITS AVAIL.	20	7.5	S. 0	2.5	
-DATA EXCHANGE STANDARDS 50-18H-DXF -CAPABILITIES 20-11C-MOVE DES/DATA ANONG SIMILAR APPL. 23 7.1 4.7 -CAPABILITIES 27-11G-DESIGN WEN ON 2 DIF SYS SINUL, 21 7.0 5.3 -UNIT ECHNOLOGY 14-07G-COMSULTING SERVICES 12 6.0 7.0DATA EXCHANGE STANDARDS 44-18B-STEP/PDES 44-18B-STEP/PDES 14-18C-17C-17G 17G 17G 17G 17G 17G 17G 17G 17G 17G	EXCHARGE	45-18C-16ES	16	7.3	• . •	•	
-CAPABILITIES 20-11C-MOVE DES/DATA AMONG SIMILAR APPL. 23 7.1 4.7 -CAPABILITIES 27-11B-DESIGN MEN ON 2 DIF SYS SIMUL. 21 7.0 5.3 -UTILIZING MEN DIG SERVICES 12 6.0 7.0 5.3 -DATA EXCHANGE STANDARDS 43-10A-CAD FRANKORK INITIATINYE (CFI) 20 6.4 4.5 -DATA EXCHANGE STANDARDS 44-10B-STEP/PDES 14 6.0 7.0 -DATA EXCHANGE STANDARDS 47-10E-1PC-350 -DATA EXCHANGE STANDARDS 47-10E-1PC-350 -DATA EXCHANGE STANDARDS 31-11F-MOST S/W PURCHASED FROM ONE VENDOR 22 5.2 6.4 -	EXCHANGE		7.	7.3	•.•	• · •	
-CAPABILITIES 27-118-DESIGN NCM OM 2 DIF SYS SIMUL. 21 7.0 5.3	\$	ANDNE	23	7.1	4.7	2.5	
-UTILIZING MCM TECHNOLOGY 14-07G-COMSULTING SERVICES -DATA EXCHANGE STANDARDS 45-10A-CAD FRANKWORK INITIATINVE (CFI) 20 6.0 4.0 -DATA EXCHANGE STANDARDS 44-10B-STEP/POES -COMSIDERING MCM TECH. 97-09G-COMSULTING SERVICES 13 6.0 7.0 -DATA EXCHANGE STANDARDS 31-11F-MOST S/W PURCHASED FROM ONE VENDOR 22 5.2 6.4	05-CAPABILITIES	ON 2 DIF SYS	2.1	7.0	8.3	1.1	
-DATA EXCHANGE STANDARDS 43-10A-CAD FRAMEWORK INITIATINYE (CFI) 20 6.0 4.0 4.0 -DATA EXCHANGE STANDARDS 44-100-STEP/PDES 14 6.4 4.5 -CONSIDERING MEN TECH. 07-09G-CONSULTING SERVICES 1 6.0 7.0 -DATA EXCHANGE STANDARDS 47-10E-1PC-350 4.5 -CAPABILITIES 31-11F-MOST S/W PURCMASED FROM ONE VENDOR 22 5.2 6.4 -		14-076-COMSULTING SERVICES	12	•.•	7.0	-0.2	
-DATA EKCHANGE STANDANDS 44-188-STEP/PDES 14 6.4 4.5 -CONSIDERING WEN TECH. 07-09G-CONSULTING SERVICES 1 6.0 7.0 -DATA EXCHANGE STANDANDS 47-18E-1PC-350 -CAPABILITIES 31-11F-MOST S/W PURCMASED FROM ONE VENDOR 22 5.2 6.4 -		43-18A-CAD FRANCKORK INITIATINYE (CFI)	20	•.•	•	2.0	
-CONSIDERING MEN TECH. 07-09G-CONSULTING SERVICES 1 6.0 7.0DATA EXCHANGE STANDARDS 47-18E-1PC-350 -CAPABILITIES 31-11F-MOST S/W PURCHASED FROM ONE VENDOR 22 5.2 6.4	8-DATA EXCHANGE	44-188-S1EP/PDES	7.4	4.9	4.5	6.7	
-DATA EXCHANGE STANDARDS 47-18E-1PC-350 -CAPABILITIES 31-11F-MOST S/W PURCMASED FROM ONE VENDOR 22 5.2 6.4 -	-CONSIDERING MC	G	-	• •	7.0	-1.0	
5-CAPABILITIES 31-11F-MOST S/W PURCMASED FROM ONE VENDOR 22 5.2 6.4 -1	-DATA EXCHANGE	-186-196-350	13	8.8	٠.	6.0	
	05-CAPABILITIES	-111-HOST S/W PURCHASED FROM ONE	2.2	5.2	6 .4		

CATEGORY	## ## ## ## ## ## ## ## ## ## ## ## ##	RESPONSES	MEAN	MEAN	#EAN GAP	
O1-COMSIDERING NEW TECK.	04-050-1651	•	10.0	٥.	9.6	
	23-100-ACCESS TO CHIP & COMPONENT DATA	23	•	9.1	4.4	
05-CAPABIL111ES	26-11A-BI-DIRECTIONAL TRANSLATION OF DATA	23	•	•.•	3.4	
05-CAPABILITIES		23	7.7	4.4	3.3	
DA-DESIGN/HFG OF HCH'S	DATA	2.	9.2	9 .0	3.8	
-SELECTING MCM	BRING COST	20	•	8.8	2.8	
02-UTILIZING MCM TECHNOLOGY	11-070-7657	•-	9.6	9.9		
O6-MCM OFSIGN ENVIRONMENT	36-12E-SUPPORT HEW FOUNDRIES W/DESIGN KITS	2.1	7.0	* .4	2.9	
07-SELECTING MCM MFG	38-178-DESIGN KITS AVAIL. FROM HFG/VENDOR	20	7.5	S.0		
05-CAPAB1L171ES	28-11C-HOYE DES/DATA ANGNG SIMILAR APPL.	23	7.1	4.1	2.5	
DA-DESIGN/HIG OF NCH'S	25-10f-AUTOMATED TESTING & QUALITY METHODS	22	1.1	• •	2.3	
DESIGN	37-12F-OPTIMIZATION OF MANUFACTURING DATA	-1	7.	6.8	2.2	
O6-HCH DESIGN ENVIRONMENT	53-128-STSTER PARTITIONING	2.1	• •	. · ·	2.2	
O6-HCH DESIGN ENVIRONMENT	35-120-PACKAGING TECHNOLOGY SELECTION	2.1	•	6 .2	2.1	
u	06-05f-ENGINEERING SUPPORT	-	10.0	0.	2.0	
OS-DATA EXCHANGE STANDARDS	46-18D-ED1F	2.2	7.7	5.7	7.0	
DB-DATA EXCHANGE STANDARDS	43-16A-CAD FRANEWORK INITIATINYE (CFI)	20	• •	• •	7 . 0	
02-UTILIZING HCH TECHNOLOGY	09-078-SUBSTRATE FABRICATION	10	4.4	7.5	1.9	
DB-DATA EXCHANGE STANDARDS	44-188-STEP/PDES	14	•.•	4.5	1.9	
07-SELECTING HCM HFG	39-178-MFG REPUTATION/EXPERIENCE/RECORD	7.7	• •	7.1	1.0	
HCH	12-07E-DESIGN SOFTWARE	11	6.7	•.•	. .	
J11111110	00-07A-DESIGN	=	٧.٧	7.6	1.1	
07-SELECTING NCH AFG	42-17E-ENGINEERING SUPPORT & CONSULTING	2.1	1.1	6.3	1.1	
		2.1	7.0	8.8	1.1	
	20-10A-DESIGN AUTOMATION SOFTWARE	22	•	• . •	7.6	
		1.0	. .	• •	7.6	
5		42	٠.	•.•	1.9	
	24-10E-DESIGN METHODS TO IMPLEMENT MCM'S	\$2	٠.	• •	1.3	
06-MCM DESIGN ENVIRONMENT	-12C-AUTOROUTING	23	•:	1.2	1.3	
07-SELECTING NEW NFG	40-17C-TECHNOLOGY OFFERED BY MANAFACTURER	21	•	7.6	1.2	
O1-CONSIDERING MCM TECH.		~	10.0	.	o. ~	
-CONSIDERING MC	CS-OSE-DESIGN SOFTENSE	- ;	10.0	0.	٠. ٥	
EXCHANGE		52	D .	7.1	•	
	47-106-176-350	2	\$ · \$	•.	• .	
		12	•	•	•	
02-UTILIZING MCM TECHNULOGY	SUPPORT	61	٠.	7.4	•. D	
-CAPABILITIES	30-11E-EA SOFTWARE APPL. BEST IN ITS CLASS	2	1.1	•.9	•	
GB-DATA EXCHANGE STANDARDS	45-100-1665	16	7.3	6.3	• •	
GO-DATA EXCHANGE STANDARDS	49-186-60511 STRCAH	2.2	0.	7.5	9.0	
DB-DATA EXCHANGE STANUARDS	20-10x-0x7	21	7.3	• •	٠.٥	
02-UTILIZING MCM TECHNOLOGY	-07G-COMSULTING	12	•	7.0	-0.2	
O1-CONSIDERING MCM TECH.		-	9 .0	7.0	-1.0	
05-CAPABILITIES	31-11f-MOST S/W PURCHASED FROM ONE VENDOR	22	5.2	4 . 9	-1.2	

- ALL ACSPONSES SURVEY PERIOD 9512 - ALL

OVERALL Satisfaction Average

AESPONSES

6.85

2.7

088 - PROGRAM = STATS

QUESTION	1164	FREQUENCY
O1-MMT USAGE	CURRENTLY USING FUTURE MNT USAG	21
03-CURRENT ASSEMBLY		1.
03-CURRENT COMSULTING SERVICES		1.4
D3-CURRENT DESIGN		20
03-CURRENT DESIGN SOFTWARE		11
03-CURRENT ENGINEERING SUPPORT		2.1
CY-CUBRERT SUBSIDATE TABRICATION		12
03-CUBRENT 1EST		16
OA-FUTURE ASSEMBLY		n
DA-FUTURE COMSULTING SERVICES		~
DA-FUTURE DESIGN		•
DA-FUTURE DESIGN SOFTWARE		•
DA-FUTURE ENGINEERING SUPPORT		•
DA-FUTURE SUBSTRATE FAGRICATION		•
OA-FUTURE TEST		•
06-FUTURE MCM-C CERAMIC LOW TEMP COFIRED		•
06-FUTURE MCM-C CERAMIC TMICK FILM		•
D6-FUTURE MCM-D THIN FILM ON SILICON OR CERANIC		n
O6-FUTURE MCM-HDI CHIPS-TIRST		
06-FUJURE MCM-L LAWINATE		•
O6-FUTURE OTHER		•
D8-MCM-C CERAMIC LOW TEMP COFIRED	CURRENT FUTURE	13
OB-MCM-C CERAMIC THICK FILM	CURRENT	12

	ALL RESPONSES
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QUE 5110M	1160	
DE-NCM-D THIN FILM DN SILICON DR CERAMIC	CURRERT	
OB-MCM-MDI CHIPS-FIRST	CURRENT	~ •
DB-MCM-L LAMINATE	CURREL	N S
09-DESIGN 1001S	FOR CAE FOR CAN FOR CAN FOR OVERALL	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
13-CURRENT ENGINCERING	YES No No Sure	2.8
19-MATCH CONCURRENT DESIGN ENVIRONMENT	OTHER	-
16-INVESTING IN DESIGN AUTONATION SYSTEMS	EXIMEMELY IMPOR VERY IMPORTANT IMPORTANT NOT IMPORTANT	1 6 6 1

09:25 MONDAY, DECEMBER 6, 1993

CATEGORY='

RESPONSE Number Comment	8 BENEFITS HAVE NOT BEEN WELL DENONSTRATED BY VENDORS.		RESPONSE NUMBER COMMENT	12 NO PERSONAL INVOLVENENT. 12 NO PERSONAL INVOLVENENT. 27 INFRASTRUCTURE NOT THERE. STILL VERY IMMATURE. 12 MOULD BE EVALUATING HIMSELF. NOT CONFORTABLE MITH.		RESPONSE NUMBER COMMENT	12 "CHIPS & WIRE" APPLICATION UNDERWAY. 12 NOT SURE 1 PROPERTIES OF MATERIALS NOT YET INVESTIGATED. COST IS PRIMARY 1 CONSIDERATION.		RESPONSE NUMBER COMMENT	SUBCONTRACT TMIS ACTIVITY SUBCONTRACT TMIS ACTIVITY A RECT IT DON'T MARRIED FIRET	USE, DON	INFREDUENT	1) CATESTAL DESCRIPTION	EXTERNAL		ACSPONSE NUMBER COMMENT	3 "UNCLEAR", CATEGORY NOT SPECIFIC EMDUGN TO ANSWER. 5 USES A TOOL DESIGNED FOR CIRCUITBOARDS; DOESN'T ALMAYS WORK FOR MCM 6 DESIGN TOOLS IMMATURE. 8 RATED TOOLS. 14 NANY DESIGNS IMMATURE.
QUEST10M	78-16-IMPORTANCE INVEST DESIGN AUTOMATION	CATEGORY=01-CONSIDERING MCM TECH.	QUEST10W	03-09C-ASSEMBLY 04-05D-1EST 04-05D-1EST 06-05F-EMGINEERING SUPPORT	CATEGORY = 01 - CONSIDERING USING MCM	QUESTION	68-6D-MCM-D THIN FILM ON SILICON OR CERAMI 69-6E-MCM-WOI CHIPS-FIRST 70-6F-DIMER 70-6F-OTHER	CAIEGORY=02-UTILIZING MCN TECH.	MOESTION	53-38-SUBSTRATE FABRICATION 53-3C-ASSEMBLY 88-3F-3C-ASSEMBLY 88-3F-3C-ASSEMBLY			SO-ST-ERGINGERING SCPTORY	27-56-FONSCLING SERVICES	CATEGORY.02-UTILIZING MCM TECHNOLO	QUESTION	08-07A-DESIGN 08-07A-DESIGN 08-07A-DESIGN 08-07A-DESIGN

PROGRAM . COMMENTS

SURVEY PERIOD 9312

09:25 HONDAY, DECEMBER 6, 1995

CATEGORY-02-UTILIZING MEM TECHNOLO (CONTINUED)

ONLY USE SENIOR EXPERIENCED PEOPLE, MAINLY N.J.T.'S WITH MASTER DEGREES SCPABAIC WHAT SUBCONTRACTOR CAN OFFCR VS. WHAT CUSTONER CAN DO ON THEIR MANUTACTURERS AND DESIGNERS DON'T UNDERSTAND THE BUSINESS MELL-ENDUGH USES A 1001 DESIGNED 107 CINCUITBOARDS, DOESS'T ALKAYS KORK 107 MCM. SIMULATION CRITICAL TO SUCCESS, AND TOOLS ARE NOT SUFFICIENT NOT ALL CAD VENDORS SUPPORT NCM TECHNOLOGY. TOOLS VERY MARD TO USE, AND BARELY CAPABLE OF DOING 308. "UNCLEAR", CATEGORY NOT SPECIFIC ENOUGH TO ANSWER. SATISFACTION RATING WOULD BE BIASED. STILL IMMATURE "UNCICAR", CATEGORY NOT SPECIFIC ENDUGH TO ANSMER. LIMITED TOOLS FOR TEST GENERATION. MEED BETTER. INMATURE FROCESSES, LIMITED VENDOR FOOL. "Unclear", category not specific enough to answer. "UNCLEAR", CATEGORY NUT SPECIFIC ENGUGN TO ANSWER INDUSTRY ARABEMESS OF TEST SOLUTIONS SEEM VACCE. CORPLEX BECAUSE 17 15 A SUBSYSTEM. STILL IMMATI NO GOOD DIE. DESIGN TECHNOLOGY NEEDS SOME IMPROVEMENTS. AND 12 PLUS YEARS OF EXPENIENCE. "CURRENT DESIGN DOES NOT MEET OUR MEEDS." LIBRARIES NOT AVAILABLE SUPPORTING NCM. 3UST LEANNING TO DESIGN FOR TEST. "WE DO IT RIGHT THE FIRST TIME." RATED FACILITIES. LOW YIELDS. COMMENT RESPONSE 20 10 09-076-SUBSTRATE FABRICATION 09-076-SUBSTRATE FABRICATION 13-07f-ENGINEERING SUPPORT 13-07F-ENGINEERING SUPPORT 13-07F-ENGINCERING SUPPORT 13-07f-ENGINEERING SUPPORT 13-07F-ENGINEERING SUPPORT 13-07f-ENGINEERING SUPPORT 13-07f-ENGINEERING SUPPORT 13-07F-ENGINEERING SUPPORT SOFINARE SOFTWARE 12-07E-DESIGN SOFTWARE 12-07E-DESIGN SOFTWARE SOFINARE 10-07C-ASSEMBLY 10-07C-ASSCHBLY 12-07C-DESIGN 12-07E-DES1GN 12-07E-DESIGN 12-07E-DES1GN 08-07A-DESIGN 08-07A-DESIGN 08-07A-DESIGN 11-070-1651 11-070-11 11-070-1EST 11-070-1651 11-070-1151 11-070-1651 11-070-1651 **QUESTION**

CAIEGORY=03-PLANNING OR USING MCM

14-07G-CONSULTING SERVICES

WOULD RATE

PROVIDE CONSULTING SERVICES, DON'T USE CONSULTING SERVICES

MAJOR PROBLEM IS GETTING INFORMATION ON IC'S.

SATISFACTION RATING OF 5 APPLIES TO RECEIPT OF SERVICES.

SATISFACTION RATING WOULD BE BIASED. HIS FIRM AN B AS A SERVICE PROVIDER.

KNOW WHAT WE'RE DOING."

14-076-CONSULTING SERVICES 14-076-COMSULTING SERVICES 14-076-CONSULTING SERVICES 14-076-CONSULTING SERVICES 14-076-CONSULTING SCRYICES

NIWAYS ROOM FOR IMPROVEMENT.

COMMENT	NO PLANS.	SOME USE.	MEAN FUTURE.	IN EVALUATION HOW.	NO PLANS.	CERANIC HYBRID USED.	FORMER USE.	PHASING GUT.	NO PLANS.
RESPONSE	•	•	•	20	•	•	11	20	•
					HICK FILM	HICK FILM	HICK FILM	HICK FILM	17-08C-MCM-C CERANIC LOW TEMP COFIRED
	LAHIMATE	LAMINATE	LANINATE	LANINATE	CERAMIC 1	CERANIC 1	CERANIC 1	CERANIC 1	CERANIC L
QUEST10M	15-08A-MCH-L LANIMATE	15-08A-MCM-L LANIMATE	19-08A-NEM-L LAMINATE	15-08A-MCM-L LANINATE	16-088-MCM-C CERAMIC THICK FILM	16-008-NCM-C CERANIC INICK FILM	16-088-HCM-C CERANIC INICK FILM	16-088-MCM-C CERANIC INICK FILM	17-08C-MCM-C

CATEGORY.03-PLANNING OR USING MEN (CONTINUED)

	SECTORSE	
QUESTION		
17-08C-MCK-C CCRAMIC LOW TEMP COFIRED	•	PREDOKINARTLY USED.
17-08C-MCM-C CERAMIC LOW TEMP COFIRED	11	TORKER USE.
17-08C-MCM-C CERANIC LOW TEMP COFINED	20	IN EVALUATION.
18-080-HCH-D THIN FILM ON SILICON/CERAMIC	11	TORKER USE.
18-080-HCM-D THIN FILM ON SILICON/CERANIC	13	NO PLANS.
18-060-HCM-D THIR FILM ON SILICON/CERANIC	*1	POSSIBLE USE, NOT IN IMMEDIATE FUTURE.
18-080-MCM-D ININ FILM ON SILICON/CERANIC	20	NOW USING, BUT NEEDS WORK TO IMPROVE VIELDS.
18-080-NCH-D THIN FILM ON SILICON/CERANIC	24	COST 100 HIGH.
19-006-ECE-EDI CEIPS-FIRST	~	ZO PLASS.
19-00C-ECE-EDI CEIPS-FIRST	•	ED PLASS.
19-08[-MCM-MD] CHIPS-FIRST	^	ED PLASS.
19-08C-KCK-KD1 CK1PS-F1RS1	11	RO PLANS.
19-086-ECE-EDM CE175-71957	-1	DOESN'T KEOK KEAT SCHIPS FIRST'S IS.
19-00E-MCM-HDI CHIPS-FIRST	20	WILL PROBABLY NEVER USE DUE TO FACT IT WON'T MEET MILITARY STAMDARDS.

CATEGORY=04-DESIGN/NFG OF MCM'S

90.051.00	RESPONSE	COMMENT
20-10A-DESIGN AUTOMATION SOFTWARE	•	"OUR DLS."
20-10A-DESIGN AUTONATION SOFTWARE	•	"REIRO-FITED TECHNOLOGY."
20-10A-DESIGN AUTOMATION SOFTWARE	•	MEM SOFTWARE INMATURE, FUEL MEM SIMULATION NOT FEASIBLE VET.
20-10A-DESIGN AUTONATION SOFTWARE	-	AREN'T ENDUGH LINKS OF ANY PARTICULAR CAD TOOL PROVIDER, NOT INTERFACED
20-10A-DESIGN AUTOMATION SOFTWARE	-	TO EMBUGH HER MANUFACTURERS.
20-10A-DESIGN AUTOMATION SOFTWARE	13	TOO COMPLEX TO DISCUSS.
20-10A-DESIGN AUTONATION SOFTWARE	20	IN PROCESS. WILL BE INFORTANT.
20-10A-DESIGN AUTONAFION SOFTWARE	2.7	FINE FOR DIGITAL.
21-108-INTEGRATION OF DESIGN TOOLS FOR NCM	~	THE IMPORTANCE OF DESIGN TOOLS IS OVERRATED, DESIGN TASKS ARE NOT
21-108-INTEGRATION OF DESIGN TOOLS FOR NCH	^	EXTREMELY DIFFICULT.
21-108-INICCRATION OF DESIGN TOOLS FOR NCH	•	"OUR TOOLS STAND ALONE."
21-108-INTEGRATION OF DESIGN 10015 FOR NCM	•	VENDORS ARE INTERESTED DALY IN PUSHING THEIR PRODUCTS, RATHER THAN
21-108-INTEGRATION OF DESIGN 100LS FOR NCH	•	MAKING BRICGRATION CASY.
21-108-INTEGRATION OF DESIGN TOOLS FOR NCH	13	"INDUSTRY HAS A MAYS TO GO."
21-108-INTEGRATION OF DESIGN TOOLS FOR NCM	-:	TOOLS "AREN'T THERE VET," AND ARE "TOO STAND ALONE." INTEGRATION
21-108-INICGRATION OF DESIGN TOOLS FOR NCH	*	BECUIRES INTERNAL MORK.
21-108-INTEGRATION OF DESIGN 10015 FOR NCM		TRANSLATION DATA REQUIRED.
21-108-INICGRATION OF OCSIGN TOOLS FOR HCM	21	STILL MORKING ON 11.
OF DESIGN	7.7	STILL MEW TECHNOLOGY. DON'T KNOW IF MAPPY VET.
21-108-INTEGRATION OF DESIGN TOOLS FOR NCH	2.5	DEVELOPED FOR WIRED BOARDS. WON'T WORK AS ANALYSIS TOOL.
22-10C-STANDARDS DATA TRANSFER-DESIGN/NFG	~	*INCRC ARC NO STANDARDS."
22-10C-SIANDARDS DATA TRANSFER-DESIGN/HFG	~	NOTHING IN PLACE VET, LOTS MORE TO BE DOME.
	•	USES EXISTING STANDARDS FOR OTHER PRODUCT DONAINS THAT DON'T MEET NEW
DATA	•	NEFOS.
	^	VENDORS PREFER USING THEIR DAW INTERNAL FORMATS INSTEAD OF ESTABLISHING
- 10C - STANDARDS	,	STANDARDS.
22-10C-STANDARDS DATA THANSFER-DESIGN/NFG	•	"FARTICIPATING IN ARFA ASIN AT MCC" TO HORK ON IMPROVMENT FOR THIS.
22-10C-STANDARDS DATA TRANSFER-DESIGN/MFG	11	NO STANDARD FOR THIS REALLY, EXCEPT FOR GERBER.
22-10C-STANDARUS DATA TRANSFER-DESIGN/MFG	16	NECESSARY 10 ACHIEVE LOW COST AND FIRST TIME SUCCESS, AND STANDARDS

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CATEGORY=04-DESIGN/HFG OF HCH'S (CONTINUED)

	RESPONSE	
QUESTION	NUMBER	COEMENT
22-10C-STANDARDS DATA TRANSFER-DESIGN/NFG	16	ARE NOT WIDELY AVAILABLE.
DARDS DATA TRANSFER-DESIGN/NF	1.7	DON'T DO HUCH IN THIS FIELD. NOT REAL FAMILIAR.
2-10C-STANDARDS DATA TRANSFER-DESIGN/NF	•	CAD VENDOR OUTPUT INCOMPATIBLE WITH MANUFACTURING.
2-10C-STANDARDS DATA TRANSFER-DESIGN/NF	61	ASE NO STANDARDS IN THE MARKET AND NO ONE IS ROBRING NARD ENGLES ON
2-10C-STANDARDS DATA TRANSFER-DESIGN/NF	19	1161.
ANDARDS DATA TRANSFER-DESI	2.1	MOT WELL DEVELOPED YET.
-10C-STANDARDS DATA TRANSFER-DESI	2.7	NEVER AS TRANSPARENT AS PEOPLE CLAIM.
-100-ACCESS 10 CHIP & COMPONENT DAT	2	MOST VENDORS DON'T OFFER.
-100-ACCESS TO CHIP & COMPONENT DAT	•	
-100-ACCESS TO CHIP & COMPONENT DATA	•	PAD LAYDUTS AND SIMULATION MODELS (INCLUDING TIME AMALYSIS) ARE
TO CHIP & COMPONENT DATE	•	DIFFICULT TO GET FROM VENDORS.
CHIP	1	IC VENDORS SLOW TO PROVIDE BARE DIE DATA TO LEVEL PROVIDED FOR
CHI	1	DIE DATA.
23-100-ACCESS TO CHIP & COMPONENT DATA	•	FEW CHIP MANUFACTURERS WILL PROVIDE DATA. THOSE WHO DO PROVIDE DATA
	•	DON'T PROVIDE VERY MUCH.
	•	INFORMATION SHOULD BE PRINTED IN DATA BOOK. AT PRESENT, NEED TO MAKE
23-100-ACCESS TO CHIP & COMPONENT DATA	•	FORMAL, WRITTEN REQUEST. ACCESS SMOULD BE EAST.
23-100-ACCESS 10 CHIP & COMPONENT DATA	10	"I'M SPOILED BECAUSE I WOR' TOR SEMI-CONDUCTOR."
3-100-ACCESS 10	11	HAVE TO INSERT INFORMATION INTO SYSTEM MANUALLY, NO STANDARD FOR
3-100-ACCESS TO CHIP & COMPONENT DAT	11	
CHIP & COMPONENT DAT	=	
& COMPONENT DATE	16	COMMERCIAL/MILITARY VENDORS NOT FULLY SUPPORTIVE OF CMIP SALES.
TO CHIP & COMPONENT DATE	9 7	CHIP VENDORS DATA UNAVAILABLE AND IMACCURATE.
DF ACCESS TO CHIP & COMPONENT DAT	19	TOO EXPENSIVE.
OD-ACCESS TO CHIP & COMPONENT DAT	20	DESIGN DUR DER
OD-ACCESS TO CHIP & COMPONENT D	21	
23-100-ACCESS TO CHIP & COMPONENT DATA	2.2	INFORMATION NOT AVAILABLE FROM VENDORS ON STANDARD FORMAT.
OD-ACCESS TO CHIP & COMPONENT DAT	23	A TAJOR PROBLER.
TO CHIP & COMPONENT DAT	52	
10 CHIP & COMPONENT D	2.7	VENDORS NOT SET UP. MUST CHASE DOWN PRODUCT ENGINEERS AND MANAGERS
DO-ACCESS 10 CHIP & COMPONENT D	2.3	TO ACQUIRE INFORMATION.
4-10E-DESIGN METHODS TO IMPLEMENT MCM'	~	L MEED IMPROVEMENT.
4-10C-DESIGN NETHODS TO IMPLEMENT MCH'	•	MCM STILL IN INFANCY. NEEDS D.D.D./VENDOR/USER COALITION TO DEVELOP A
-DESIGN METHODS TO IMPLEMENT MEN	•	GOOD METMODOLOGY.
A-10E-DESIGN METHODS TO IMPLEMENT	11	LOTS OF TALK, LITTLE ACTION OR REAL KNOWLEGGE.
DE-DESIGN METHODS TO IMPLEMENT	=	
-10F-AUTOMATED TESTING & QUALITY	•	
TESTING & QUALITY	-	IN BEIMEEN PRINI CIRCUITBOARDS OR INTEGRATED CIRCUITS.
DMAIED TESTING & QUALITY METHOD	11	TEST IS A PROBLEM.
OMATED TESTING & QUALITY METHOD	=	
25-10F-AUTOMATED TESTING & QUALITY METHODS	1.1	PAC SUPPLIERS.
TESTING & QUALITY METHOD	1.	INCOMING DIE 5 ANDARDS MUST BE PERFECT, QUALITY MEED TO BE STEPPED UP.
25-10F-AUTOMATED TESTING & QUALITY METHODS	70	
25-10f-AUTOMATED TESTING & QUALITY METHODS	12	ABILITY TO ACQUIRE KNOWN GOOD DIE, NO GOOD SOLUTION. FIXTURING IS A
25-10F-AUTOMATED TESTING & QUALITY METHODS	2.7	PROBLEM WITH DIGITAL AWALDG ON 17'S OWN.

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CATEGORY=05-CAPABILITIES

9UES710M	SESPONSE NUMBER	CONNENT
A-BI-DIRECTIONAL TRANSLATION OF DATA	80 (DATA TRANSFERS DIFFICULT, 1.E., CADENCE TO MENTOR.
LIA-GI-CIRCTIONAL TRANSLATION OF CAT.	* •	TO EXISTING GIANDATO SATINGTING TELS ARED.
I-DIRECTIONAL TRANSLATION OF UNITEDIATEDE OF OA	• ~	KENDORS AME 100 PADPRIETARY.
-11A-81-DIRECTIONAL TRANSLATION OF DATA	11	IS AWARE OF.
BI-DIRECTIONAL TRANSLATION OF DAT	13	YET. SOFTWARE IS UNPROVEN. INDUSTRY
6-11A-61-DIRECTIONAL TRANSLATION OF DAT	13	HEADING RIGHT MAY, MOST NOT SHOOT!
-11A-61-DIRECTIONAL TRANSLATION OF DAT	13	
6-118-81-DIRECTIONAL TRANSLATION OF DAT	9 7	LACK OF STANDARDS. CAD/CAE VENDORS SLOW TO ADOPT EXISTING STANDARDS.
6-118-BI-DIRECTIONAL TRANSLATION OF D	=	•
6-11A-61-DIRECTIONAL TRANSLATION OF DAT	19	MOT ONE ON MARKET. STILL MEEDS TO BE DEVELOPED.
6-11A-81-DIRECTIONAL TRANSLATION OF DA	20	LEADER OF ASEM FOR ARPA CONTRACT.
6-11A-81-01ACCTIONAL TRANSLATION OF DAT	21	STILL NOT FULLY DEVELOPED VET.
6-11A-81-DIRECTIONAL TRANSLATION OF DATA	11	WILL IMPLEMENT FURTHER DOWN THE ROAD.
I TRANS	2.7	ROT AS TRANSPARENT AS PEOPLE CLAIR.
2 DIF SYS	~	
2 DIF SYS	~	
HCH ON 2 DIF SY	~	NO FRANCEGORK OR DATA STANDARD IN PLACE TO PERFORM THIS EFFORT.
-118-DESIGN MCM ON 2 DI	•	NOT FEASIBLE WITH TODAY'S TOOLS.
7-118-DESIGN NEW ON 2 DIF SYS SI	,	ACTIVITY WILL BE DIFFICULT TO DO UNTIL EDA VENDORS STOP PUSNING
7-118-DESIGN MEM ON 2 DIF SYS SI	,	720721E17224 T02X215.
7-118-DESIGN NEW ON 2 DIF SYS SINU	•	HAVE CONTRACT REGULACING FOR THIS CAPABILITY. DIFFICULT TO DO. LACK
7-118-DESIGN NCH ON 2 DIF SYS	•	OF LINKAGE BETWEEN VENDORS IS VERY LIBITING.
-118-DESIGN NCH ON 2 DIF SYS	14	COCSR'T NATICE.
27-118-DESIGN NCH ON 2 DIF SYS SINUL.	20	DON'T SEE A NEED TO DO.
A AMONG	~	UNIQUE SIEPS NECESSARV, NO GOOD INTEGRATION.
-11C-NOVE DES/DATA ANDNG	•	NO FRANCIORK OR DATA STANDARD IN PLACE TO PERFORM THIS EFFORT.
-HOVE DES/DATA AHONG SINI	1	WILL BE DIFFICULT TO DO UNTIL STANDARDS ARE IDENTIFIED AND SUPPORTED
S/DATA AHONG SIHILAR	1	
S/DATA AHONG SIMILAR	0.	STANDARD FORMAT.
S/DATA ANDNG SINILAR A	16	
8-11C-MOVE DES/DATA ANDNG SINILAR APP	-	
DES/DATA AMONG SINILAR A	20	HAVE NO REASON TO DO THIS.
8-11C-MOVE DES/DATA ANGNG SIMILAR	21	MOT DEWELOPED WELL.
DES/DATA ANDNG	11	WILL IMPLEMENT LATER.
AMONG SIMILAR	23	HARD TO DO. WOULD BE GREAT IF WE COULD.
I DATA IN NEUTRAL FILE FAM	~	
HEH DATA IN NEUTRAL FILE FR	•	ADVENT OF STEP STANDARD WILL REQUIRE THE DELIVERY OF STEP FOR MCM
HCH DATA IN MEUTRAL FILE FRM	•	Tacourias.
HCH DATA IN MEUIRAL FILE FRM	•	
MEM DATA IN NEUTRAL FILE FRM	1	MEUTRAL FILE IS NOT DEFINED TO COVER DIFFERENT MEM DESIGN LEVELS. WILL
E HEN DATA IN NEUTRAL FILE FRM	,	BE CHALLENGE TO GET VENDOR SUPPORT ONCE THEY ARE DEFINED.
MEN DATA IN MEUTRAL FILE FR	-	SH. 1
MCM DATA IN MEUTRAL FILE F		NO REAL STANDARD FOR THIS.
24-110-STORE MEM DATA IN MEUTRAL FILE FAMT	•	TECHNOLOGY IS STILL EVOLVING.

PROGRAM . COMMENTS

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COMMENIS FROM EDA DICE MARKET STUDY SURVEY BY CAIEGORY BY QUESTION NUMBER SURVEY PERIOD 9312 - ALL RESPONSES

CATEGORY=05-CAPABILITIES (CONTINUED)

COMMENT	MEUTRAL FORMAT, CAD SYSTEM INDEPENDENT. STILL MEEDS DEVELOPING.	DON'T KROK. Rot akar it can be done.	SILL INPLEMENT LATER.	INTEGRATION TROUBLE	ACH POINT TOOLS ARE VERY INNATURE.	NORE INFORTANT TO OPTIMIZE ENTIRE DESIGN PROCESS TRAN TO NAVE THE BEST	DESIGN TOOL IN 115 CLASS.	VERY NAME FOR ONE VENDOR TO DEVELOP JOB AND SUPPORT DESIGN.	SOFIWARE VENDORS MAVE NOT ADOPTED OPEN FRAME WORK.	MIET CUSTOMESS REQUIRENEES.	*DCHO OCESTION. *	IMMATURE TECHNOLOGY.	WE USE WIDE VARIETY OF TOOLS.	MULTIPLE VENDORS ARE ACCEPTABLE WHEN INTEGRATION IS 6000.	BETTER IF COULD BUY SEPARATE TOOLS FROM SEPARATE VENDORS. VENDORS	SHOULD WORK TOEFTHER IN INTERATION.	CAN'T STANDARDIZE ALL DN DNE SET OF TODIS TO GET ALL OF THE	TECHNOLOGIES REQUIRED.	EACH SOFTWARE PACKAGE DIFFERENT. INVOLVES PRODUCT, CAPABILITY, AND		NOT IMPORTANT.	
RESPONSE	11	20 21	2.2	•	•		,	13	91	=	20	2.2	23	~	^	•	-	-	11	17	20	
QUEST10M	DATA IN NEUTRAL P	29-110-510RE MEM DATA IN MEUTRAL FILE FRMT 29-110-510RE MEM DATA IN MEUTRAL FILE FRMT	DATA IN NEUTRAL	FIRARC APPL. BEST IN 115 C	SOFTWARE APPL.	30-11E-EA SOFTWARE APPL. BEST IN 175 CLASS	30-116-EA SOFTWARE APPL. BEST IN 175 CLASS	30-116-EA SOFTWARE APPL. BEST IN 115 CLASS	30-11E-EA SOFIWARE APPL. BEST IN 115 CLASS	30-11E-EA SOFTWARE APPL. BEST IN 17S CLASS	30-11E-EA SOFTWARE APPL. BEST IN 175 CLASS		SOFTWARE	31-11f-HOST S/W PURCHASED FROM ONE YENDOR	31-11f-MOST S/W PURCHASED FROM OME VENDOR	31-11f-HOST S/W PURCHASED FROM ONE VENDOR	I S/H PURCHASED FROM	I S/W PURCHASED FROM ONE	I S/W PURCHASED	S/W PURCHASED	T S/W PUNCHASED FROM ONE	

CATEGORY=06-NCM DESIGN ENVIRONMENT

32-12A-5751C	NOT MANY SYSTEM TOOLS AVAILABLE. NOT MANY SYSTEM TOOLS AVAILABLE. DON'T DO IT. "UNCLEAR", NOT SPECIFIC ENDUM TO ANSWER. DESIGNERS AREN'T USED TO THE LEVEL OF INTEGRATION POSSIBLE. PARTITIONING OFTEN DONE BEFORE SPECIFICITIONS, OFTEN NOT A BIG ROLE PLAYED. CURRENT TOOLS DON'T ADDRESS MIGH LEVEL BEHAVIORAL SIMULATION TO ALLOW PARTITION OFTINIZING. TOOLS DON'T EXIST. MIGH LEVEL SIMULATION NOT THERE. NOT MELL-ADAPTED TO MEN YET. "UNCLEAR", NOT SPECIFIC ENDUM TO ANSWER. DON'T USE IT. AUTOROUTING TOO DIFFICULT FOR MASSES TO USE. DIFFICULTY ROUTING FULL
34-12C-AUTOROUTING 6	ECT.S.

PROGRAM = COMMENTS

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CONNENTS FROM COA DICE MARKET STUDY SURVEY BY CATEGORY BY QUESTION WUNDER SURVEY PERIOD 9312 - ALL RESPONSES

CATEGORY-06-MCH DESIGN ENVIRONMENT (CONTINUED)

GUESTION	NE STORSE	COMMENT
	4	
1 2C - AUTOROUT 1M	0.	TOOK COMPLETION ON
34-126-48108087186	~	SINGLE LAYER NOW.
12C-AUTOROUTIN	-	10015
2C-ABIDAGUT	-	FALL SEDET SUPPORTING MOM DERSITY MEGUINEMENTS.
5-120-PACKAGING ICCHNOLOGY SELECTIO	~	.EAR", NOT SPECIFIC ENGUGN TO ANSWER.
120-PACKAGING TECHNOLOGY SELE	_	PROVIDERS UNWILLING TO RELEASE INFORMATION, SEEM TO FEAR EXCLUSION
5-120-PACKAGING TECHNOLOGY SELECTIO	^	LATER STAGE OF DEVELOPMENT OF MCM TECHNOLOGY.
20-PACKAGING	•	"DOESM'T EXIST, REALLY."
AGING TECHNOLOGY SELECTIO	•	"AEALLY NOTHING AVAILABLE NOW."
AGING TECHNOLOGY SELECTIO	70	A DECISION-MAKING 1001 WOULD BE WELPFUL.
AGING TECHNOLOGY SELECTIO	22	STILL MAVE A LONG WAY TO GO.
PACKAGING TECHNOLOGY	23	'T EXIST.
AGING TECHNOLOGY SELECTIO	2.3	DON'T GIVE HELP IN SIMULATION AND VARIATION. MAYE TO DRAW ON PAST
PACKAGING TECHNOLOGY S	2.7	EXPERIENCE.
SUPPORT NEW FOUNDAIRS W/DESIG	~	FEW VENDORS OFFER.
SUPPORT MEN FOUNDRIES W/DESIGN KIT	n	, NOT SPECIFIC ENOUGH
SUPPORT NCH FOUNDRIES W/DESIGN KIT	•	THERE.
-12E-SUPPORT NCM FOUNDRIES W/DESIGN	^	MERE. " FOUNDAIES JUST BEGINAIN
SUPPORT NEW FOUNDRIES W/DESIGN KIT	-	NOT MEASLY ENOUGH INTERCONNECTION, AND NOT ENOUGH OLSIGN RIVS.
-SUPPORT MCH FOUNDAIRS W/DESIGN KIT	=	
-12E-SUPPORT MCM FOUNDRIES W/DESIGN KIT	12	
-12E-SUPPORT MCM FOUNDAILS W/DESIGN KIT	=	NOT MANY DESIGN KITS AVAILABLE FOR TECHNOLOGY.
-12E-SUPPORT NEW FOUNDAILS W/DESIGN KIT	20	ENERGING TECHNOLOGY.
21-SUPPORT MCM FOUNDRIES W/DESIGN KIT	22	IN A115 VET.
-12E-SUPPORT NEW FUUNDATES W/DESIGN KIT	23	
PE-SUPPORT NEW FOUNDRIES W/DESIGN KIT	23	
E-SUPPORT MEM FOUNDRIES W/DESIGN K	2.7	DOM'T DO 11; WHEN THEY DO, WON'T GUARANTEE. COST.
PF-OPTIMIZATION OF MANUFACTURING O	~	-UNCLEAR", NOT SPECIFIC ENDUGH TO ANSWER.
2F-OPIINIZATION OF MANUFACTURING	•	
7-12F-OPTIMIZATION OF MANUFACTURING	•	BEING ABLE TO MODEL MANUFACTURED PRODUCT DURING DESIGN WOULD LOWEN
2F-OPIINIZATION OF MANUFACTURING O	•	INCREASE VIELD.
7-12F-OPTIMIZATION OF MANUFACTURING	•	
7-12F-OFTIMIZATION OF MANUFACTURING	•	UNDERSTAND"
7-12f-OPTIMIZATION OF MANUFACTURING	16	ILE STATISTICAL INFORM
7-12f-OFTIMIZATION OF MANUFACTURING DA	=	01 48
-12f-OPTIMIZATION OF MANUFACTURING	~	DOESN'T EXIST YET.
ì		
	RESPONSE	
9UE 5110N	NONDER	CONFER
	•	HOST VERBORS DON'T OFFER COMPLETE WITH ALL EDA PLAIFORMS.
	. •	TO SPEAK OF
	• ~	
TOTAL CONTRACT TOTAL CONTRACT OF STREET	•	NOT FROMIN WITS AVAILABLE, 100 FEW MINKAGES BETWEEN VENDORS.
	• •	CAPABILITIES.
THE CANCER ALTO AVAIL. TROS	, o	
	7.7	DOX.1 [X15] VE1.

C051

COMEMIS FROM EDA DILL MARKE SIUDY SUNTEY BY CATEGORY BY BUCSTION NUMBER SURVEY PERIOD 9312 - ALL RESPONSES

CATEGORY-07-SELECTING MEN NFG (CONTINUED)

Z 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	RESPONSE	COMMENT
	;	
TOURS AND THE TAX SOUTH TOURS OF THE TAX SOUTH TOURS OUTH TOURS OF THE TAX SOUTH TOURS OF T	•	
. 39-178-EFG BEPUTATION/EXPERIENCE/RECORD	•	EXTRICACE GASE 15 STILL GOLLOIMS.
39-178-NFG REPUTATION/CAPERIENCE/RECORD	07	NOT A LOT OF APPLICATIONS THAT MANE BEEN EXPEDIENTLY DONE.
	-	
	1.1	NOT A LOT OF EXPERIENCE WITH ANY MANUFACTURER YET. MEW TECHNOLOGY.
	61	COST 100 MIGH.
39-178-NFG REPUTATION/EXPERIENCE/RECORD	23	ENGRHOUS VARIETIES OF CAPABILITIES IN THE INDUSTRY.
AS-17C-1CCARGLOGY OFFERED BY MANAFACTURES	20	NO DNE CAN SUPPLY. USE DUR OWN IN-MOUSE SOURCE.
OFFERED BY	2.1	LIMITED AT THIS POINT.
OFFERED BY	23	EDT EATUER.
COST OF PROC	•	TECHNOLOGY IS IMPROVING, BUT MARD TO ESTABLISM VIELDS OR COSTS OF
C051 0f	~	PAGDUCTION AUMS.
COST OF	,	"CHICKEN AND EGG THING." COSTS WON'T GG DOWN UNTIL VOLUMES ARE UP, AND
COST OF	^	VICE-VERSA.
COST OF	•	LOW VOLUME SITUATION.
COST OF	01	IDA VOLUME REGUIMENTS DON'T ALLOW ECONOMIES OF SKILL.
C051 0F	11	COSTS TOO NIGH IN GENERAL.
COST OF	16	NCM MEEDS TO PRODUCE WIGH VOLUME TO DRIVE DOWN COST ON LEARNING CURVE.
C057 0F	13	COST 700 NIGH.
C057 Of	20	THE SE IN A LEARING PROCESS.
COST 05	7.	COST TOO NIGH.
C051 0F	22	EDT INFORTERAT, RED CO.
C057 OF	22	PRICE IS NOR CONING DOKE.
S SUPPOR	•	
•	1	FOUNDRIES MAYEN'T FIGURED OUT THEIR BUSINESS MODELS, AND SUPPORT WILL
SUFFORT &	,	BE CONFUSING UNTIL TMEY DO.
SUPPORT &	19	NON-RECURSING COST SKOULD BE LESS THAN 25K PER DESIGN.
CATEGORY. 06-DATA EXCHANGE STANDARD		
	RESPONSE	

QUESTION 43-18A-CAD FRANCWORK INITIATINVE (CFI) 43-18A-CAB FRANCWORK INITIATINVE (CFI)	RESPONSE NUMBER 2	CDENENT HAKING PROGRESS. NOT REALLY A STANDARD, THEY'RE A GROUP.
43-18A-CAD FRANCEORK INITIATINE (CFI)	•	HAVEN'T PRODUCED ANTHING VET.
43-18A-CAD FRANCHORK INITIATINE (CFE)	•	VERY SLOW IN DEVELOPING.
AS-18A-CAD FRANCHORK INITIATINE (CFI)	•	STANDARD GOOD, CAD TOOL PROVIDERS NOT SUPPORTING WELL.
INITIATINVE	13	NOT READY FOR CERTIFICATION. MEED TIME FOR VENDORS TO IMPLEMENT.
AA-188-5177/PDES	~	LOOKS PROMISIRG.
8 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2	~	KOT GAMILIAM MITM.
\$304/4315-981-74	•	#02 BH024 135CK 1
A==100-S1(P/PDES	•	MAS RIGHT INFO CONTENT, BUT NO USEFUL UNTIL VENDORS SUPPORT.
\$ 100-STEP/80ES	-	008.1 656.
A4-108-5179/PDFS	11	NOT FAMILIAR WITH.
2 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	12	MOT FAMILIAR WITH.
AA-188-5167/PDES	-	SOI MATHEMAN SHIT.
	=	DOM'T USE THESE STANDARDS. DOES NOT SUPPORT MEM MOM.
44-188-51EP/PDE5	•	NO STANDARDS YET.

PROGRAM . COMMENTS

09:25 MBMDAY, DECEMBER 6, 1993

CATEGORY=00-DATA EXCHANGE STANDARD (CONTINUED)

MILL BE USED FOR MEM-C AND MEM-L UNTIL VENDORS SUPPORT -MORE ROBUST IMPROVING IN NOI IECHNOLOGY. NOI IMPORTANT EXCEPT FOR THIM FILM ON MOT FAMILIAN WITH. Musi live with legacy data format -- Smould Phase imto Step/Poes. Everyome's "flayon" varies Slightly. Difficult translations; lose SOMETHING MORE THAN "DRAFTING LANGUAGE" WILL BE MEEDED FOR MIGH-NOT A WELL-DEFINED STANDARD. Right info content, but not useful until vendors support MARD TO DO WITH DIFFERENT TOOL SETS AND INTERFACE EXP Does not support hem now. BETTER THAN GERBER, BUT LIMITED. CONTENTS INADEGUATE FOR ELECTRICAL RULE VERIFICATION NOT FAMILIAR WITH. CONTENTS INADEQUATE FOR ELECTRICAL RULE VERIFICATION CONTENTS INADEQUATE FOR ELECTRICAL RULE VERIFICATION USED AS GUIDE. LONG TIME COMING OUT. EMMANCEMENT AND UPGRADE NEEDED FOR NEW. DOCSH'T SUPPORT A LOT OF MCH FEATURES. NO SIGNIFICANT VENDORS ARE SUPPORTING SHOULD BE REPLACED. OUTDATED FORMAT. DUIDAIED FORMAT. OUTDATED FORMAT BETTER THAN GERBER, BUT LIMITED. NO ONE HAS EDIF STANDARDS MAYEN'T USED. Does not support hem now, "NOT A GOOD STANDARD." DOM'T KNOW WHAT IT IS. NOT REAL TIME TO US. SHOULD BE MEPLACED. SHOULD BE REPLACED. SHOULD BE REPLACED. SHOULD BE REPLACED. SILICON SUBSTRATE. NOT FAHILIAR WITH. NOT FAMILIAR WITH. NOT FAMILIAR WITH. NOT FAMILIAR WITH. HOT FAHILIAR WITH COMPLEXITY MCM'S. VERY LITTLE USE. HAVEN'T USED. HAVEN'T USED. STANDANDS. . . T. T. C. DON'T USE. DON'T USE COMMENT RESPONSE RUBER 49-186-60511 STREAM 49-186-60511 STREAM 49-186-60511 STREAM 49-14G-GDS11 S1AEAR 49-186-G0511 STREAM STREAM 17-10E-1PC-350 17-18E-1PC-350 17-18E-1FC-350 47-18E-1PC-350 47-18E-1PC-350 47-10E-1PC-350 17-10E-1PC-35E 17-18E-1PC-550 17-10E-1PC-350 17-186-186-358 18-10F-GERBER 48-18F-GENBER 10-107-GERBER 18-10F-GERBER 10-10f-GCRBER 18-10F-GERBER 19-106-60511 13-100-1605 19-10C-1GLS 13-10C-1GES 15-10C-1GES 15-186-1665 19-100-1608 15-100-1005 16-180-EDIF 16-100-ED1F 15-10C-16ES 15-100-1605 46-18D-ED1F 16-100-EDIF 16-180-EDIF 6-180-EDIF 6-100-E01F 16-100-CDIF 50-10H-DXF 30-18H-DXF 50-18N-DXF 50-18H-DXF **BUESTION**

CATEGORY-09-PHASES OF MEM PLANNED

CONMENT	MAYBE; SOME IN MOUSE, SOME SUBCONTRACTED. MAYBE	MAYDE. MAYDE		CONNENT	SYNOPSIS VIEWLOGIC, CADEMEE, VARIOUS SIMULATORS.	CANTACT CONCEY!, NEWTON CHATTILY DESIGN NACH.	XIIXAO XI	CADENCE CONCEPT, CADENCE RAPID SIN	VIEWLOGIC, 2YCAD, SOME OF CAD TOOLS	DON'T PREPARE AS SEPARATE TRON CAD	SAME AS CAD	SAME AS CAD, JUST BROADER TERN	QUATAL LABORATORIES, THERMAL PACKAGE PACIFIC NUMERIES	NOT SCREEN TRICEGES.	THE CHAPTICS		MENTOR CRAPHICS	EMETOR, CADMECM, EARRING, MATHRESTER TEERENGERS.		1	DEA 3D AMALYSIS TOOLS, TANGO, VENILOG, R SPICE, LINE SIS PROGE	CAN IN MOUNT SANIER		VIEWLOGIC	MENTOR	EASSIS FOR	CADENCE ALEGRO, MENTON BOARD AND AND ALL AND A		DIS EXDER BEXDOSS	BACELL VISULA, MENIOR GRAPHICS, MEN STATION	MCM ALLEGRO	CADENET TENTON, NAMES OF ALSO SOME TON INVENTAL VOOLS	CADERCE, REMICH GRAFMICS, MARKS LOA		
RESPONSE	to en -	1 2 A		RESPONSE		~ ~	••	•	•	•	01		13	4	5 T	17	10	4 T	21	2.2	23	e s	7 7 7	27	3.0	1	6 0 1	~ •	^ ◀	•	•	•	• 1		2
90557108	59-48-SEBSTRATE TABRICATION 60-46-ASSETTELY	61-40-TEST 62-4C-DESIGN SOFTWARE 64-AG-CONSULTING SERVICE	CATEGORY=10-DESIGM TOOLS	90[51]08	-9A-100LS	72-9A-160LS FOR CAE 72-9A-160LS FOR CAE	-94-100LS FOR CA		-94-100LS FOR CA	-9A-TOOLS FOR CA	72-94-10015 FOR CAL 12-04-10015 FOR CAL	-9A-100LS FOR	-9A-TOOLS FOR CA	-9A-1001S FOR CA	72-9A-100LS FOR CAE	-9A-10015 FOR	-9A-100LS FOR	-9A-TOOLS FOR CA	72-98-10015 FOR CAL 72-68-10015 FOR CAE	-9A-10BLS FOR	-9A-1001S FOR	2-9A-1001S FOR CA	72-48-10015 for CAL 33-58-10016 for CAL	2-9A-100LS FOR	2-9A-100LS FOR	73-98-100LS FOR CAD	-98-100LS FOR CA	-98-100LS FOR CA	73-98-100[S FOR CAO	-98-10013 for CA	-98-100LS FOR CA	50	3-98-100LS FOR	-98-1001S for CA	75-78-10015 708 170 75-98-10015 708 CAD

FRUGRAM = COMMENTS

CATEGORY=10-DESIGN TOOLS (CONTINUED)

COMENT	# 4 2 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5	THE STATE OF THE S	ENERGY TARGET TO STATE OF THE S	TARAN AND THE PROPERTY OF THE		EASTIS COA. MENTOR CRAPLICS	MENTOR GRAFFICS, ERREIS TIMESSE	MINION, CADENCE. TARRIS, INTERGRAPH	SUN SPARK SYSTEM, MENIOR, COPPER CHYAN ENHANCEMENT	RENIOR	GDT & MARRIS FINESSE	MARRIS FINESSE, IC EDITORS, LAYOUT, DRE, LYS	•		THEDA, EUCLIO	FINESSE		INTERNALLY DEVELOPED TOOLS	DIS UNDER WINDOWS	COMPUTER	16H INTERNAL TOOLS	DON'T REGARD AS SEPERATE FROM CAD	MENTOR GRAPHICS, AUTOCAU	205X51EFA	GERBER CONVERTERS, CAD-CAN TYPE PROGRAW	INTEGRATED WITH CAD	NOT DEFINED, USE MANY			NOT COLORY BUT AILL COL INTERPRET.		MILIANG TARREST TO THE TRANSPORT OF THE	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		ALLEGEO	THE STATE OF SECTION SECTIONS	DOLIT KNOT TO BE DETERMINED.	13 TOUSE OFSIGN	DEC STATION	CADENCE DESIGN FRANCEDRE II & VALID FRANE, NEWTON FALCON FRANCEORE	SAME AS CAE-(MENTOR MEN STATIOR, CADENCE ALLEGNO STATION). MOTWING	"S175 ON 10P OF THEIR MENTOR OR CADENCE.		MENTOR GRAPHICS	CADENCE TOOLS	CADEMCE, 18M TOOLS	CADENCE, MENIOR	APOLLO
RESPONSE	•••		~ ~		16	17	• 7	19	20	21	2.2	2.3	**	52	56	2.2	20	-	•	•		•	•	10	11	13	3.	15	19 1	7	D (^ • • • • • • • • • • • • • • • • • • •		7 %	•	25	36	2.5	28	-	~	•	^	•	•	•	•	•	•
90[51]08			-48-1001 5 508	**************************************	**************************************	-98-100LS FOR CA	98-1001S FOR CA	-98-100LS FOR CA	-98-1001S F	-98-100LS FOR CA	-98-TOOLS FOR CA	-98-10015 FOR CA	98-1001S FOR CA	-98-10015 FOR CA	-98-100LS FOR CA	98-1001S FOR CA	3-98-100LS FOR	4-9C-100LS FOR CA	4-9C-100LS FOR	4-9C-100LS FOR CA	•	-1001S FOR CA	-100LS FOR CA	-1001S FOR	4-9C-1001S FOR CA	4-9C-100LS FOR CA	4-9C-100LS FOR	4-9C-100LS FOR CA	9C-10015 FOR CA	4-9C-10015 FOR	9C-10015 FOR CA	7C-188LS FOW CA	-96-1001S TON C			CONTRACT STREET		75-10015 FOR CA	A-96-18018 FOR EA	5-90-1001S FOR 0	S-90-1001S FOR OVERAL	-90-100LS FOR GVE	-90-100LS FOR OVER	-90-1001S FOR OVE	-90-100LS FOR OVERA	-90-TOOLS FOR OVERA	-90-1001S FOR UVERAL	FOR OVERA	-90-100LS F

CATEGORY=10-DESIGN TOOLS (CONTINUED)

COMMENT	CADENCE ON ORDER SUM SYSIEM NEWTOR NOTOROLA MOTOROLA MOTORORAPH INTERGRAPH INTERGRAP	COMMENT "TOOLS ARE NOT MIGHLY INTEGRATED."	ABLE TO COMPLETE A LOT WITH MCM TECHNOLOGIES, BUT IT MAS POTENTIAL TO BE FAR HORE PRODUCTIVE. CURRENT ENVIRONMENT MAS PROVEN VERY EFFECTIVE, BUT BETTER TOOLS AND PROCEDURES WOULD MAKE IT MORE PRODUCTIVE. "IT WORKS!" HAVE GOOD POINT SOLUTIONS; BUT INTEGRATION, COLLABORATIONS,	NETHODOLOGIES & INTRASTRUCTURE ARE LACKING. MCM DESIGN & FABRICATION IS FEASIBLE; DOING A FAIR ANDUNT OF 17. "MOULD BE EASIER IF TOOLS WERE FURTHER ALONG." MY SATISFACTION WILL BE LOW UNTIL STANDARDS ARE DEFINED AND TOOL KITS ARE AVAILABLE." HAVE HADE PROGRESS IN EDUCATING PEOPLE IN MCM TECHNOLOGIES AND CHANGES REQUIRED TO DESIGN AND MANUFACTURE, BUT "STILL HAVE A LONG MAY TO GO."	OF DESIRED CAD TOOLS OR WITH THE VARIETY OF VENDORS DESIRED. DOING TOO MANY THINGS AT ONE TIME. THEY ARE LACKING TOOLS THAT WOULD MAKE TOR GREATER EFFICIENCY. MEED TO MARKE SOME PURCHASES. USING "CNIP & MIRE" ON THIN FILM SUBSTRATE IS SO DIFFERENT FROM PRINTED CINCUITBOARD THAT THEY VE HAT TO MAKE ADJUSTMENTS IN PROCEDURE. NEW SOFTWARE IS EXPECTED TO TAKE CLUMSINESS OUT. FIELS THEIR MEEDS FOR DESIGN AND ANALYSIS ARE BEING FILLED, " NO NOTES.
RESPONSE		RESPONSE NUMBER	N N M M 4 M	N 4 4 P P P P	
QUESTION	75-90-10015 FOR OVERALL	UESTION 9-19-0VERALL SATISF		9-19-0VERALL SATISFACTI 9-19-0VERALL SATISFACTI 9-19-0VERALL SATISFACTI 9-19-0VERALL SATISFACTI 9-19-0VERALL SATISFACTI 9-19-0VERALL SATISFACTI	

PROGRAM = COMMENTS

CATEGORY=11-OVERALL SATISFACTION (CONTINUED)

AESPONSE NUMBER COMMENT	TATEBELIAND NOT SERVICE OF SERVICE OF STREET SERVICE THE SERVICE OF SERVICE O	15 USE OF CORCUSARN FROINCEAND CLOSE INTERFACE WITH MARKETACTURING.	16 HARTIN MARICILA HAS INVESTED HEAVILY ON CONCURRENT CNGINGERING TODIS	16 EFICE ARE PAYING OFF.	17 THE PRODUCT DESIGN IS CONFIEM. BURNESTRATIVE AREAS ARE THE	17 REAL PROBLEM.	18 FOUNDAY DOES NOT CURRENTLY SUPPORT ENGINEERING DESIGN.	19 HAVE BEEN USING & DEVELOPING FOR 15+ VEARS. WE MAVE PROVEN DESIGN AND	19 DENO OF 1ST TIME PASS.	20 "WE'RE THE LEADER IN DEVELOPING TECHNOLOGY." BUT STILL MAYE ROOM AND	20 NEEDS TO IMPROVE.	21 STILL IMPLEMENTING SYSTEM. DON'T MAVE FULLY INTEGRATED SYSTEM, PLANS	21 TO IMPROVE.	22 TECHNOLOGY & TOOLS ARE MODERATELY DEVELOPED BUT MAKING STEPS. MATERITY	22 Of 1001S AND GUR DAN EXPERIENCE ARE MOVING UP ON INE LEARNING CHRYE.	23 "WE CAN DO WORK WITH TOOLS WE HAVE, BUT 11'S VERY MARD."	24 TECHNOLOGICAL IMPROVEMENT MEEDED.	25 "ERBODIES STRICT ENGINEERING SCHPORT."	26 "ME'RE IN THE INTANCY STAGE, NOT REALLY ON BOARD YET."	27 STILL INNATURE, "HAVING TO TWEEK". MANUAL NOT AUTOMATED, BARE DIE	27 PROBLEM.	20 TECHNOLOGY IS STILL IMMATURE. "ALL SYSTEMS ARE DEING DESIGNED AS WE	1 204L-
00.557.108	9-19-0vERALL SATISFACTION	79-19-DUERALL SATISFACTION		9-19-OVERALL SATISFACTION	19-19-OVERALL SATISFACTION	79-19-OVERALL SATISFACTION	79-19-OVERALL SATISFACTION	19-19-BVERALL SATISFACTION	19-19-OVERALL SATISFACTION	٠.	٠.	19-19-DVERALL SATISFACTION	79-19-0VERALL SATISFACTION	19-19-DVERALL SATISFACTION	79-19-DVERALL SATISFACTION	79-19-OVERALL SATISFACTION	19-19-DVERALL SATISFACTION	_	19-19-DVERALL SATISFACTION	19-19-DVERALL SATISFACTION	79-19-DVERALL SATISFACTION	79-19-DVERALL SATISFACTION	

RESPONSE NUMBER

DESCRIPTION

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MCM-C AND MCM-D "ENDORS NEED TO WORK HARDER ON COST CONTROLS. MEED TO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          "WE NEED TO INVEST TIME AND MONEY TO MAKE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WORKING ON INTRASTRUCTURE TO KEEP COST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NCH IS IN 115 INFANCY, BUT BUSINESS IS DOUBLING YEAR 10 YEAR AND WILL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              "USERS NEED TO HORK WITH NEW AND CAP VENDORS ON STANDARDIZATION AND
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TECHNOLOGY IS COMING. MEED TO SOLVE DESIGN AUTOMATION PROCESS AND AQUIRE GOOD BARE DIE AND INFO ON BARE DIE OM NON-DIGITAL PROD.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NEEDS BIGGER PUSH ON STLICON VENDOR TO DELIVER TESTED DIE AT COST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FEELS THAT ANALYSIS SHOULD NOTE ANY EFFECT THERE MIGHT BE ON HIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IMPORTANT THAT ARPA CONTINUE TO FUND RESEARCH SO TECHNOLOGY CAN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          BE SUCCESSFUL AS TECHNOLOGY ADVANCES.
"Want and hope mem will do well so we can sell product."
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESPONSES BY THEIR CURRENT ARPA-FUNDED PROJECT.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IIS NEW TECHNOLOGY, NOT AT COMMERCIAL PRICING.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             "SOUNDS LIKE YOU WORK FOR MENIOR GRAPHICS." "MAVE OF IME FUTURE."
                                                                                                                             MARRIS GOVERNMENT ACROSPACE SYS DIV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HOPE MEN TECHNOLOGY TAKES OFF.
DIGITAL EQUIPMENT CORPORATION
                                                                                                                                                                                                                                                                                                                                                                      HAYES MICROCOMPUTER PRODUCTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CRITICAL TECHNOLOGY IN NCH.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TALK LESS AND PROVIDE HORE.
                                                                                                  RAYTHEON CAE OPERATIONS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  INTERCHIP SYSTEMS INC
                                                                                                                                                                                                                                      HARRIS SEMICONDUCTOR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CHARLES DRAFER LABS
                                                                                                                                                                                                                                                                                                                                                                                                                                                  TEXAS INSTRUMENTS
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CONTINUE TO GROW.
                                                                                                                                                                                                                                                                                                                                                                                               MARTIN MARIETTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SHI ELECTRONICS
                                                                                                                                                                                                                                                                                          HICRO NETWORKS
                                                                                                                                                                                   USC-181-M0518
                                                                                                                                                                                                                                                                                                                     EASTHAN KODAK
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      INTEGRATION."
                        MAYO CLIMIC
                                                 H CHIP INC
                                                                                                                                                                                                              ANDRANDES
                                                                                                                                                                                                                                                                   ANDRANDUS
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                                                                                                                                                                                                                                                                                                                                             HOTOROLA
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RAYTHEOR
                                                                                                                                                                                                                                                                                                                                                                                                                            ACUSTAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SUCHES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GENERAL COMMENTS
COMPANY NAME
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COMMENT

RESPONSE

DESCRIPTION

GENERAL CONNENTS	3.0	. 2200
SUVERVER COMMENTS	=	MR. ATKINSON WOULD NOT RATE THE DEGREE OF SATISFACTION HE EXPECTED TO
	-	EXPERIENCE AND WOULD SAY ONLY THAT HE EXPECTED TO MAVE HIS ENGINEERS "BE
	-	MAPPY". (SEE QUESTIONS 5, 10, 11, 12, 16, 18G)
	^	REALLY PRESSED TO FIND OUT THE ORIGINATOR OF THE SURVEY. FOUND
	n	QUESTIONS 7 (8 INTOUGH 14 ON REPORT) AND 12 (32 INTOUGH 37 ON REPORT) 160
	^	CONFUSING 10 ADDRESS. DID NOT ASK QUESTION 17 (38 THROUGH &2 ON REPORT).
	~	PARTICIPANT'S TIRE IS AN ECH MANUFACTURER. THEIR THRE MAS SOME KIND OF
	M	INVOLVENENT AT PRESENT WITH ARPA, SOME FUNDED PROJECT.
	•	DID RD1 ASK QUESTION 17-(SB THROUGH 42 ON REFORT), PARTICIPANT 18
	•	PROTOTYPE DEVELOPER.
	•	FOUND THE EXAMPLES CITED IN 118 (NUMBER 27 IN MEPORT) TO BE IN CONFLICT
	•	WITH THE DESCRIPTION OF THE CAPABILITY. HE WOULD LIKE A COPY OF THE STUDY
	•	ENER IT IS COMPLETE, IF POSSIBLE.
	•	"EAGER 10 KNOW SOURCE OF SURVEY."
	-	THIS IS THE SECOND OR THIRD COMPLAINT THAT BU.STION 17A (NUMBER 50 DK
	•	REPORT) IS REDUNDANT. HE WOULD LIKE TO RECEIVE A COPY OF THE STUDY WHEN
	-	IT IS COMPLETE.
	10	PRESSED "MARD" FOR ME 10 CONFIRM THAT I WORKED FOR MARRIS CORPORATE
	10	MEADOUARTERS AS MIS TELEPHONE INDICATED. GLENN PETERSEN SAID HE WILL CALL
	01	MB. SALATIND THIS PM TO SMOOTH THE WAY FOR MEMAINDER OF SURVEY.
	10	BE-CONTACTED BM. SALATING AFTER MM. PETERSEN'S CALL, MEN'S SKOOTMLY.
		THIS CONFANY MANUTACTURES HEM'S, SO QUESTION 17 (36 THROUGH 42 IN
	-1	AEFORT)IS NOT AFFLICABLE.
	20	MR. GATES WOULD LIKE A COPY OF FINAL SURVEY WHEN COMPLETED.
	2.1	THIS IS AN RAD FACILITY AND HE DID NOT FEEL HE COULD ANSWER THE
	23	SATISFACTION PART ON SOME QUESTIONS.
	56	COULD NOT GIVE SATISFACTION RATINGS BECAUSE "WE ARE JUST GETTING INTO
	26	NCS. S.
	2.7	MOULD LIKE A COPY OF STUDY WHEN COMPLETE.
	2.8	COULD NOT ANSWER SATISFACTION RATINGS, JUST GETTING INTO IT.

SURVEY PERIOD 9312 - CURRENTLY USING MCM BY QUESTION GAP INDEX = 1.74

09:25 HONDAY, DECEMBER 6, 1993

CATEGORY	90ES110N	RESPONSES	# T I I	MEAN	REAR	
02-UTILIZING MCM TECHMOLOGY	68-07A-DESIGN	• •	6.3	7.6	1.1	
	09-078-SUBSIRATE FABRICATION	0.7	4.6	7.5	1.9	
	10-07C-ASSENDLY	12	•	0.	•	
	11-070-1£ST	=	9.6	9.9	٥.٥	
	12-07E-DESIGN SOFTWARE	11	9.7	6.9	7.0	
	13-07f-Exclutering support	19	r. •	1.4	•.	
	14-07G-CONSULTING SERVICES	12	9.9	7.0	-0.2	
04-DESIGN/NFG OF NCH'S	20-10A-DESIGN AUTOMATION SOFTWARE	20	\$.	6.9	9.6	
		20	n	9.9	1.1	
	-10C-STANDARDS DATA	2.1	9.2	6 .0	3.2	
	23-100-ACCESS TO CHIP & COMPONENT DATA	20	9.3	5.5	1.4	
	TO IMPLEMENT	2.1	9.6	•	1.3	
	5-10F-AUTOMATED TEST	19	9.	•	2.2	
05-CAPABILITIES	26-11A-BI-DIRECTIONAL TRANSLATION OF DATA	20	7.8	4.5	3.3	
	7-118-DESIGN NCH ON 2 DIF SYS SINUL.	=	• •	9.1	1.1	
	26-11C-MOVE DES/DATA ANONG SIMILAR APPL.	20	7.1	•.•	2.5	
	= <	20	7.6	• .	3.3	
	30-11E-EA SOFTWARE APPL. BEST IN 175 CLASS	20	7.7	• •	6.0	
	31-11f-MOST S/W PURCHASED FROM ONE VENDOR	=	•	6.3	-1.5	
TREMEDICAL RULVEC RUN-YO	SECULATIVE SPICE SECULATIONS	9-	9	7 7	₹, 1	
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	THE REPORT OF THE PROPERTY OF	<u>:</u> :	· ·	•		
	S7-12f-OFTINIZATION OF MANUFACTURING DATA	-		•	7 . 1	
07-SELECTING NCW NFG	38-17A-DESIGN KITS AVAIL. FROM MFG/VENDOR	16	7.1	•.•	2.5	
	39-178-NFG REPUTATION/EXPERIENCE/RECORD	17	0 .6	•.•	2.1	
	40-17C-TECHNOLOGY OFFERED BY MAMAFACTURER	11	1.1	1.6	1.1	
	41-170-RECURRING COST OF PRODUCTION	11	•	5.1	3.2	
	42-17E-ENGINEERING SUPPORT & CONSULTING	17	7.0	6.2	1.6	
SGEACHARG STACKERS	AN-184-CAS FRANCESSE INITALIANTE (CFI)	91	6.3	9.4	2.1	
	AA-188-51FP/PDES	1.2		4	1.9	
	\$2-18-1-18-18-18-18-18-18-18-18-18-18-18-1	: 1	7.3	9.9	0.7	
	44-140-FO-F	=		6. 6	7.1	
	A7-185-185-350	1	8,0	•	9.0	
			1.1	7.2	6.0	
	69-186-60511 STREAM	13		7.3	9.0	
	-18H-DXF			•	•	
		1)))	· •	

SUNVEY PERIOD 9312 - CURRENTLY USING NEW RAMED BY DESCENDING IMPORTANCE

09:25 HONDAY, DECEMBER 6, 1993

CATEGORY	00057108	RESPONSES	HEAN	MEAN SAT	MEAN
>00 CHRIST WIN SHIP C	11-016-1161	•	•	•	•
		7 (•
_		91	•	· · ·	1.4
O4-DESIGN/RIG OF MCM'S	S-10E-DESIGN NETHODS TO INFLEMENT NEW S		•	•	۲.
02-UTILIZING MCM TECHNOLOGY	08-07A-0ESIGN	=	8.6	7.6	1.1
DA-DESIGN/HIG OF HCH'S	23-100-ACCESS TO CHIP & COMPONENT DATA	20	9.3	9.5	1.4
04-DESIGN/NFG OF NCH'S	22-10C-STANDARDS DATA TRANSFER-DESIGN/MFG	7.1	9.2	9 .9	3.2
101		17	9.0	6.9	7.1
I	10-07C-ASSEXBLY	12	-	•	•
I	12-07E-DESIGN SOFTWARE	11	1.1	6.9	
Z U	46-17C-1ECHNOLOGY OFFERED BY MANAFACTURER	11	1.7	7.6	7.7
-0	25-10F-AUTOMATED TESTING & QUALITY METHODS	-	9.0	4.9	× . ×
6	20-10A-DESIGN AUTOMATION SOFTWARE	20		6.9	1.6
ENY		20	6.9	7.1	1.4
07-SELECTING NEW MFG	A1-170-BECURAING COST OF PRODUCTION	17	• •	5.1	3.2
02-UTILIZING MCH TECHNOLOGY	13-07F-EAGINEERING SUPPORT	61	6.3	7.4	• •
	21-108-INTEGRATION OF DESIGN TOOLS FOR MCN	20		•••	1.1
ž		=	. 2	6.1	٠. ٧
08-DATA EXCHANGE STANDARDS		• 7	1.1	7.2	6.0
D6-NCH DESIGN ENVIRONMENT	32-12A-SYSTEM SPECIFICATIONS	16	• •	9.9	1.1
D6-MCM DESIGN ENVIRONMENT	33-128-SYSTER PARTITIONING	=	7.9	9.6	2.3
D6-HCH DESIGN ENVIRONMENT	37-12F-OPTIMIZATION OF MANUFACTURING DATA	17	7.9	9 .6	2.1
•	26-11A-BI-DIRECTIONAL TRANSLATION OF DATA	20	7.0	4.5	3.3
07-SELECTING NCM NFG	42-17E-ENGINEERING SUPPORT & CONSULTING	11	7.	6.2	1.6
OB-DATA EXCHANGE STANDARDS	46-100-E01F	19	7.8	5.1	2.1
OB-DATA EXCHANGE STANDARDS	49-186-GDSII STREAM	1.9	7.0	7.3	9.0
05-CAPABILITIES	30-11E-EA SOFTWARE APPL. BEST IN 175 CLASS	20	7.7	• •	6.9
05-CAPABILITIES	29-110-STORE HEW DATA IN MEUTRAL FILE FANT	20	7.6	• •	3.3
06-HCH DESIGN ENVIRONMENT	34-12E-SUPPORT MCH FOUNDRIES W/DESIGN KITS	11	7.5	9.4	2.9
DE-DATA EXCHANGE STANDARDS	45-10C-10ES	13	7.3	9.9	0.7
OE-DATA EXCHANGE STANDARDS	50-18H-DXF	=	7.3	•.•	•.
09-CAPABILITIES	28-11C-NOVE DES/DATA ANONG SINILAR APPL.	20	7.1	4.6	2.5
D7-SELECTING MCM MFG	30-17A-DESIGN KITS AVAIL. FROM MFG/VENDER	16	7.1	• •	5.2
02-UTILIZING MCM TECHNOLOGY	14-07G-CONSULTING SCRVICES	12	• •	7.0	-0.2
05-CAPABILI11ES	27-118-DESIGN NCM ON 2 DIF SYS SINUL.	=	9 .9	9.1	1.7
DE-DATA EXCHANGE STANDARDS	43-18A-CAD FRANCHORK INITIATINEC (CFI)	16	6.7	9.4	1.1
D8-DATA EXCHANGE STANDARDS	44-108-51[P/PDES	12	6.3	٠.	1.9
DE-DATA EXCHANGE STANDARDS	47-18E-1PC-350	11	8.0	• •	9.0
	31-11F-MOST S/W PURCHASED FROM ONE VENDOR	=	• .	6.3	-1.5

RANKED BY DESCENDING GAP
GAP INDEX = 1.74

#E A &	1 .	3.3	3.3	3.2	3.2	3.0	•.	2.5	2.5	1.3	2.2	2.1	2.1	7.	2.1	٦.	•	1.9	•	1.7	1.7	1.7	•	9.	1.4	1.4	1.3	1.1	6.0	0.9	• •	• . •	0.7	9.0	9.0	4.0	0.2	٠.
10	•	•	^	^	~	~	~	~	~	~	~	~	~	~	~	*	-	•	-	-	=	7	-	~	_	~	-	-	•	•	0	•	0	0	0	0	0	7
MEAN SAT	9.5	4.3	• •	9 .9	5.1	•.•	• •	• •	• •	3.6	•.•	6.9	4.1	5.1	5.7	• •	7.5	•	6.9	7.6	9.9	5.1	6.9	6.2	7.1	•.	0.	7.6	7.2	9 .	• •	4.4	• •	7.3	• •	6 .3	7.0	6.3
HEAR	9.3	7.6	7.6	9.2	•	9.6	7.5	7.1	7.1	7.9	9.0	9.0	8.2	7.9	7.0	6.7	٠.٧	6.3	1.1	9.3	6.3	9.9	. . .	7.8	8.5	B. B	4.6	. 7	1.1	7.7	•	. 3	7.3	7.8	5 .0	7.3	• .	•
RESPONSES	20	20	20	2.3	17	-1	11	20	16		1.9	1.1		1.7	1.9	16	2	12	11	=	20	=	20	11	20	16	12	11	=	20	12	19	13	19	11		12	• •
#0E\$110#	23-100-ACCESS TO CHIF & COMPONENT DATA	-11A-BI-DIRECTIONAL	29-110-STORE MEN DATA IN MEUTRAL FILE FRMT	22-10C-STANDARDS DATA TRANSFER-DESIGN/NFG	-170-RECURNING	11-070-1551	36-12E-SUPPORT MCM FOUNDRIES W/DESIGN KITS	28-11C-MOVE DES/DATA ANONG SIMILAR APPL.	38-17A-DESIGN KITS AVAIL. FRUM WFG/VENDOR	33-128-SYSTEN PARTITIONING	25-10F-AUTOMATED TESTING & QUALITY METHODS	39-178-2FG AEPUTATION/EXPERIENCE/RECOMD	35-120-PACKAGING TECHNOLOGY SELECTION	37-127-OPTIMIZATION OF MANUFACTURING DATA	46-180-EDIF	43-16A-CAD FRANCHDRK INITIATINYE (CFI)	09-078-SUBSTRATE FABRICATION	44-188-STEP/PDES	12-07E-DESIGN SOFTWARE	08-07A-DESIGN	21-108-INTEGRATION OF DESIGN TOOLS FOR NEW	27-118-DESIGN MEM ON 2 DIF SYS SIMUL.	20-10A-DESIGN AUTONATION SOFTWARE	42-17E-EMBINEERING SUPPORT & CONSULTING	34-12C-AUTOROUTING	32-12A-STSTEM SPECIFICATIONS	24-10E-DESIGN NETHODS TO IMPLEMENT MCM'S	40-17C-TECHNOLOGY OFFERED BY MAMAFACTURER		30-116-EA SOFTWARE APPL. BEST IN 175 CLASS	10-07C-ASSEMBLY	13-07f-ENGINEERING SUPPORT	45-10C-1GES	A9-160-00SII STACAH	47-186-186-350	50-18H-DXF	-07G-COMSULTING SERVICES	31-11f-HOST S/W PURCHASED FROM ONE VENDOR
CATEGORY	DA-DESIGN/NFG OF NCN'S	05-CAPABILITIES	05-CAPABILIIIES	04-DESIGN/NFG OF NCH'S	07-SELECTING NCM MFG	02-Ufilling MCM ICCHMOLOGY	O6-NCM DESIGN ENVIRONMENT	05-CAPABILITIES	07-SELECTING MCM MFG	D6-MCH DESIGN ENVIRONMENT	OA-DESIGN/HFG OF NCH'S	07-SELECTING MCM NFG	06-NCH DESIGN ENVIRONMENT	G6-ECT DESIGN EXVIDENTEXT	OB-DATA EXCHANGE STANDARDS	DB-DATA EXCHANGE STANDARDS	07-UIILIZING MCM IECHNOLOGY	DE-DATA EXCHANGE STANDARDS	02-UTILIZING MCH TECHNOLOGY	02-UTILIZING MCH TECHNOLOGY	DA-DESIGN/NFG OF MCN'S	05-CAPABILITIES	04-DESIGN/WFG OF MCH'S	07-SELECTING MEN NFG	06-HCH DESIGN ENVIRONMENT	D6-NCH DESIGN ENVIRONMENT	DA-DESIGN/NFG OF NCN'S	D7-SELECTING MCM MFG	DE-DATA EXCHANGE STANDARDS	05-CAPABILITIES	02-UTILIZING MCM TECHNOLOGY	ZING HCH	DB-DATA EXCHANGE STANDARDS	DB-DATA EXCHANGE STANDARDS	DE-DATA EXCHANGE STANDARDS	•	02-UTILIZING NCM TECHNOLOGY	05-CAPABILITIES

BVERALL SAIISFALFIUM SURVEY PERSOD 9312

- CURRENTLY USING NCM

RESPONSES

OVERALL Satisfaction Average

70

0.85

6.9

PROGRAM . STATS

QUE 5110M	1168	FREQUENCY
1-HH USAGE	CURRENTLY USING	2.3
13-CUBRENT CRGINFCRING	YES No Not sure	6 M H
15-MATCH CONCURRENT DESIGN ENVIRONMENT	07458	4
16-INVESTING IN DESIGN AUTOMATION SYSTEMS	EXTREMELY IMPOR VERY IMPORTANT IMPORTANT NOT IMPORTANT	► 4 ₩ ₩
3-CURNENT ASSEMBLY		1.
J-CURRENT CONSULTING SCRVICES		14
3-CURRENT DESIGN		20
S-CURRENT DESIGN SOTTEARE		11
S-CURRENT ENGINEERING SUPPORT		2.1
S-CURRENT SUBSTRATE FABRICATION		12
3-CURRENT TEST		16
B-HCM-C CERAMIC LOW TEMP COTINED	CURRENT	2 2
B-MCM-C CERANIC THICK FILM	CURRENT	12
6-MCM-D IMIN FILM ON SILICON OR CERAMIC	CURENT	I -
B-MCM-HDI CHIPS-FIRST	CURENT	w •
8-MCM-L LAMIMATE	CURRENT	13 5
9-DESIGN TOOLS	FOR CAC FOR CAD FOR CAN FOR OVERALL	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

CATEGORY= '

BENEFITS HAVE NOT BEEN WELL DEMONSTRATED BY VENDORS. COMMENT RESPONSE • 78-16-IMPORTANCE INVEST DESIGN AUTOMATION **BUES110N**

CAIEGORY.02-UTILIZING NCH TECH.

SUBCONTRACT THIS ACTIVITY SUBCONTRACT THIS ACTIVITY USE 11, DON'T MANUFACTURE. USE, DON'T CREATE. USE, DON'T DESIGN ONLY TO RAYTHEON. External EXTERNAL COMMENT RESPONSE Munber 92-38-SUBSTRATE FABILITION
93-3C-ASSEMBLY
95-3C-OESIGN SOFTWARE
95-3C-DESIGN SOFTWARE
95-3C-DESIGN SOFTWARE
95-3C-ENGINERING SUPPORT
96-3F-ENGINERING SUPPORT
97-3G-CONSULTING SCRVICES
97-3G-CONSULTING SCRVICES **OUES110N**

CATEGORY.02-UTILIZING NCH TECHNOLO

00-07A-DESIGN 00-07A-DESIGN 00-07A-DESIGN	ACSPORTER SECONDS SECO	COMMENT "Uncicar", category not specific embugn to answer. USES a tool designed for circuitboards; doesn't always work for men. Design tools immature.
	• • •	RATED TOOLS. HANY DESIGNS INHATURE.
00-07A-0651GN 06-07A-0651GN 08-07A-0651GN	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	ONLY USE SENIOR EXPERIENCED PEOPLE, NAIMLY N.I.T.'S WITH MASTER DEGREES And 12 Plus Years of experience. *Current Design Does wol neel our meeds.*
09-678-SEBS128-16 FABS1641108 09-678-SEBS128-16 FABS1641101	, n •	"CNCLFAR", CATEGORY NOT SPECIFIC FROCES TO ANSSER. INTAICAE PROCESSES, LIMITED VERDOR POOL.
	. S. S.	"UNCLEAR", CATEGORY NOT SPECIFIC ENDUGN TO ANSWER.
11-070-151	, n •	*UNCLEAR*, CATEGORY NOT SPECIFIC ENOUGH TO ANSWER.
	•	RATED FACILITIES.
11-070-1157		INDUSTRY ANAMERICS OF 129 SOCIOUS PRES VACOL. COMPLEX BECAUSE IT IS A SUBSYSTEM. STILL INNATURE.
11-070-1C51 11-070-1C51	22	NG GOOD DIE. Just Learning to design for test.
17-07C-DESIGN SOFTWARE	∢ •	"AE DO 11 EIGHT THE FIRST TIME." Inco a tool designed for circuitedands. Dorsey alaks book for her.
	•	DISIGN TICHNOLOGY MIEDS SOME IMPROVEMENTS.
12-07E-DESIGN SOFTWARE	91	SIMULATION CRITICAL TO SUCCESS, AND TOOLS ARE NOT SUFFICIENT.
12-07C-DESIGN SOFTWARE	•	NOT ALL CAD VENDORS SUPPORT NEW TECHNOLOGY.
	23	TOOLS WERN MAND TO USE, AND GARRIY CAPABLE OF BOILE USB.
15-07f-[NGINECHING SUPPORT 15-07f-(NGINECHING SUPPORT	n so	SATISFACTION RAING WOULD BE BIASED.

SURVEY PERIOD 9512 - CURENTY USING NEW

CATCORY=0?-UTILIZING NCM TECHNOLG (CONTINUED)

RESPONSE RENDER CONNERT	B SEPARATE MEAT SUBCONTRACTOR CAN OFFER VS. MEAT CUSTOMER CAN DO DE THEIR		14 HANUTACTURES AND DESIGNES BON'T UNDERSTAND THE BUSINESS WELL-ENDUCK			AND TAUDILES IN CHAING IN CHAIN ON THE CANADA TO THE CANADA THE CANADA TO THE CANADA T	TOE COMBULTING	WE'RE DOING."	S SATISFACTION RATING MOULD BE BIASED.	AN SATISFACTION BATTED OF S APPLIES TO RECEIPT OF SERVICES. WOULD	STATES OF THE ST	ALWAYS ROOM		3520453	NUMBER CORNENT	A RO PLARS.		E (NG WINDS.	S CEMANIC HYBRID USED.		20 PMASING DUT.		6 PACDOMIMANTLY USED.	11 FORKE USE.	20 IN EVALUATION.	13 EO PLAES.	POSSIBLE USE, NOT IN INNEDIAL			. 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		2		DOESN'T KNOW WHAT "CHIPS FIRST" IS.	20 WILL PROBABLY MEVER USE DUE TO FACT IT WOM'T MEET MILITARY STAMDARDS
#UC 5 1 1 0 R	13-87f-Esciences servos	S-8-7-FERRES SEPTION			-077 -ENGINELNING		14-676-CORSCITIEG SCHVICES	-076-COMSULTING	- A75- FANSAL 1146		9KT-196K92-9/9-		CATEGORY.03-PLANNING OR USING NCH		20112102			LANIMATE	CERANIC INICK	THICK	CERANIC THICK	CERANIC	CERANIC LOW TENP	CERANIC	CERANIC LOW TENP	CERANIC LOW TEMP	 THIN FILE OR STLICON/CERAL	THIM FILM DM) LO ELLA BEEL		-08C-NCN-NOI	19-006-ECK-NDI CHIPS-FIRST	19-00E-MCM-MD1 CHIFS-FIRST	- DAF-HCK-HDI	CHIPS-FIR

COMMENT -OUR DLS."

•

20-10A-DESIGN AUTONATION SOFTWARE

QUESTION

PROGRAM . COMMENTS

CATEGORY = 04-DESIGN/HFG OF HCM'S

RESPONSE

CATEGORY=04-DESIGN/NFG OF NCN'S (CONTINUED)

COLLERY	*FELTRO-FITED TECHNOLOGY.*	NIN SOLIENT LENGTH ON THE STREET OF STREET OF STREET OF STREET	ARIE ARBEITE EFE MARKETAFIER	TOO COMPLEX TO DISCUSS.	12 PROCESS. WILL BE ITPORTART.	THE INFORTANCE OF DESIGN TOOLS IS OVERBATED, DESIGN TASKS ARE NOT			VENDORS ARE INTERESTED DALY IN PUSHING INEIR PRODUCTS, RAINER INAM	MAKING INTEGRATION EAST.				ASSAIRATION DONA PROGUNICO TENENT OF TANK OF THE PROPERTY OF T			THE HE ST LESS WAS TO STREET	NOTATING IN TINITY TO BE CONT. THAT DOR'T BEEN SEEN THAT DOR'T BEEN BEEN		TILLUS TATES TATES ONE THICKNEY FORMATA TAKIFAN OF FALSE TANDER	MANAGERS TRIVER SCIES SELECTED	SATISFICATION OF SERVICE AND EDGE OF SERVICE	TARALLETTING AND ANALY OF THE TOTAL OF THE T	NE CATANANTA TO THE TRAINER TO THE TANK THE CHARACTER TO THE CHARACTER TO THE TANK THE THE TANK THE TA	ANTICOLUMN - A STRIPT	DOM I DO MACH IN A TAIN FIND TO MACH FAMILIES.	CAD VENDOR OUTPUT INCOMPATIBLE WITH NANUFACTURING.	ARE NO STANDARDS IN THE WARKET AND NO ONE IS WORKING WARD ENDUGH ON	1168.	MOST VEWDORS DON'T OFFER.	OS MISSING.	PAG LAYOUTS AND SIMULATION MODELS (INCLUDING TIME AMALYSTS) ARE	ONITING THE TABLE TO THE TABLE OF THE PERSONS.		FEW CHIP MANUFACTURES WILL PROVIDE DATA. THOSE WHO DO PROVIDE DATA	DOS.1 PROVIDE VERY RUCK.	INFORMATION SHOULD BE PRINTED IN DATA BOOK. AT PRESENT, NEED TO MAKE	2	": SPOILED BECAUSE 1 YORK FOR SENI-CONDUCTOR."	TAVE TO INSERT INFORMATION INTO SYSTEM HANDALLY, NO STANDARD FOR	•	ALBEADV NAVE FROM MOTORDA.		CHIF VENDORS DATA UNAVAILABLE AND INACCUBATE.	100 EXPENSIVE.		INFORMATION NOT AVAILABLE FROM VENDORS ON STANDARD FORMAT.	
RESPONSE	•	• •	•	13	20	n	^	•	1	•	5	: :	- !	-	•	ç °		n •		` ~		•	• :	7 7	9 4	2 -		19	19	~	•	•	•		-	-	•	•	70	=======================================	=	14	91	=	:	20	2.2	
6UES1108	0-10A-DESIGN AUTONATION SOFTWAR	TOP - DESIGN ACTORNICATION SOLVE		O-10A-DESIGN AUTOMATION SOLITAN	0-10A-DESIGN AUTOMATION SOFTWAR	1-108-INTEGRATION OF DESIGN TOOLS FOR ME	1-108-INTEGRATION OF DESIGN TOOLS FOR	1-108-INTEGRATION OF DESIGN 100LS FOR	1-108-INICERATION OF DESIGN 100LS FOR	1-108-INTEGRATION OF DESIGN TOOLS FOR	-108-INTEGRATION OF DESIGN TOOLS FOR	I-102-INITERATION OF DESIGN TOOLS TON	TO A SIDE TO THE TOTAL OF THE TOTAL		TERRETAINMENT OF THE STATE OF T	21-108-14:[CARITOR OF CLUICA LOGIS +CA MIN	THE THE THE THE PARTY OF THE PA	88837 ER-DESSE	**************************************		ANAMANDA MINORMAN ANAMANDA ANA		Z-10C-VIMMOAMOV UNIN IMMANIMA-UCULGANIMA	7-105-518865 DAIA IBABS/HR-DESIGN/HS	C.loc.Siamoando oaia imamorem.uccis.		2-10C-SIAMDANDS DAIA TRANSFER-DESIGN/NF	2-10C-STANDARDS DATA TRANSFER-DESIGN/NF	2-10C-STANDARDS DATA TRANSFER-DESIGN/NF	3-100-ACCESS TO CHIP & COMPONENT DAT	5-100-ACCESS 10 CHIP & COMPONENT DAT	S-100-ACCESS TO CHIP & COMPONENT DA	N-100-ACCESS TO CHIP & COMPONENT	A COMPONENT DA	3-100-ACCESS TO CHIP & COMPONENT	3-100-ACCESS TO CHIP & COMPONENT	3-100-ACCESS TO CHIP & COMPONENT	3-100-ACCESS 10 CHIP & COMPONENT	- 100-ACCESS TO CHIP & COMPONENT	A-100-ACCESS TO CELP & COMPONENT O	-100-ACCESS TO CHIP & COMPONENT D	1.100-ACESS 10 CHIP A COMPONENT D	3-105-ACCESS TO CHIP & COMPONENT	3-100-ACCESS TO CHIP & COMPONENT D	3-100-ACCESS TO CHIP & COMPONENT	3-100-ACCESS TO CHIP & COMPONENT	-100-ACCESS 10 CHIP & COMP	

PROGRAM = CONNENTS

CATEGORY=04-DESIGN/NFG OF NCW'S (COMFINED)

OUE 5 7 1 0 M	acsponse Number	COMMENT
24-100-ACCTSS TO CERT & COMPONENT DATA	S & C	A MANGE PROBLES.
-10C-OCSIGN NCINODS TO INPLEMENT	~	TRANSFER STANDARDS STILL MEED INPROFERENT.
METHODS TO IMPLEMENT	w (MCH STILL IN INFANCY. MEEDS 0.0.0./VENDOR/USER COALITION TO DEVELOP A
At 1961-5104 BITMODS TO INTITUTE SEE TO 1971-97	^ =	COOL ALINOLOGY. ATTION OF BIA. MADRIFORM
MILHODS TO INPLEMENT MEN	=	TOTAL OF THE TREETINGS.
TED TESTING & QUALITY	•	3 IS TEST SYSTEMS THAT MEET MEED
DMATED TESTING & QUALITY	•	IM BETWEEN PRINT CIRCUITBOARDS OR INTEGRATED CIRCUITS.
OF-AUTOMATED TESTING & QUALITY	11	TEST IS A PROBLEM.
-10f-AUTOMATED TESTING & QUALITY	•	
OPTION TO THE TEST OF CONTROL WELKED	13	
29-10f-Automated Testing & Quality methods 29-10f-Automated Testing & Quality methol.	2 0 0 2 0 0	INCOMING DIE STANDARDS MUST BE PERFECT, GUALITY MEED 10 BE STEPPED UP. Inplementing now.
QUEST10N	NO LO	COMMENT
26-11A-81-DIRECTIONAL TRANSLATION OF DATA	N	DATA TRANSFERS DIFFICULT, I.E., CADENCE TO MENTOR.
-114-81-DIRECTIONAL TRANSLATION OF DAT	•	
OM OF DAT	•	NEARLY IMPOSSIBLE TO DO THIS.
BI-DIRECTIONAL TRANSLATION OF DAT	,	VENDORS ARE 100 PROPRIETARY.
BI-DIRECTIONAL TRANSLATION OF	11	THAT HE IS AVARE OF.
BI-DIRECTIONAL TRANSLATION OF DAT	13	
-DIRECTIONAL TRANSLATION OF DAT	£ 1	
-DIRECTIONAL TRANSLATION OF	<u> </u>	
ALAC TO MOLITARIA TANDEL TANDEL TO TOTAL ALACATE TANDEL TA	•	INTER OF STREETS. TABLET VENDENS SIGN TO ROOF! EXISTING STANDANDS. Forensetta bett to affige had a feet beet for a catego.
-DIRECTIONAL TRANSLATION OF DAT	•	DE DEVELO
6-11A-BI-DIRECTIONAL TRANSLATION OF DAT	20	LEADER OF ASER FOR ARTA CONTRACT.
ECTIONAL TRANSLATION OF DAT	2.2	WILL IMPLEMENT FURINER DOWN THE ROAD.
NCH ON 2 DIF SYS	~	
LIB-DESIGN NEW ON Z DIF SYS	^ •	MARK.
27-118-CEOLGE BEN ON 2 OIL 519 514CE.	^ *	NOT FERMINER NOT DESCRIBED AND THE STATE OF THE CORP. THE CORP. THE STATE STAT
MEN ON 2 DIF SYS) ~	DE DIFFICULT
-110-DESIGN NCH ON 2 DIF SYS SINUL	^	PROPRIETARY FOREATS.
118-DESIGN NCN ON 2 DIF SYS	-	THIS
-118-DESIGN NCM ON 2 DIF SYS	•	OF LINKAGE BETWEEN VENDORS IS VERY LIMITING.
-118-DESIGN NCH ON 2 DIF SYS	67	
-118-DESIGN MCM ON 2 DIF SYS SINU	20	DOW'T SEE A MEED TO DO.
DES/DATA ANDMG SINILAR	~	CAIGUE STEPS MECESSARY, NO GOOD INTEGRATION.
-IIC-MOVE DES/DATA ANDRE SIMILAR	•	
20-11C-KOVE DES/DATA ANDRE STRILAR APPL.	~ ~	MILL BE DIFFICULT TO DO UMTIL STANDARDS ARE IDENTIFIED AND SUFFORTED FOR DESCRIPTION DATA AT WARTOUS LEVELS.
- MOVE DESCRIPTION - MOVE SINITED	- =	THE CASE ALMORED FORMAL
DES/DATA AHONG SINILAR	9	

PROCRAM . COMMENTS

CATEGORY-03-CAPABILITIES (CONTINUED)

QUE S 1 1 0 M	RESPONSE	COMMENT
C-MOVE DES/DATA ANONG SINILAR	1.	1001S FOR
C-MOVE DES/DATA ANONG SINILAR	50	
	7.7	MARILIANIA LANGUA DE PERSONA DE P
"IIC-MOVE DESCONTA MICHE SIMEENM	3 ~	TOBERALS ROT MELL-STANDARDINED.
-110-STORE MEM DATA IN NEUTRAL FILE FRM	•	ADVENT OF SIEP STANDARD WILL REQUIRE THE DELIVERY OF STEP FOR MEN
D-STURE MEN DATA IN MEUTRAL FILE FRM	••	PRODUCTS.
THE CANDED MER DATA AR RECTEAL FILL FRE	•	
IN MEUTRAL FILE	. ~	RECEALLENGE TO GET VENDOM SUPPORT DRUE TREY ARE DEFIRED.
10-STORE NCW DATA IN MEUTRAL FILE FRM	•	DOCSN'I EXIST, REALLY.
ID-STORE NEW DATA IN NEWTRAL FILE F	11	NO REAL STANDARD FOR THIS.
-110-STORE MEN DATA IN MEUTRAL FILE F	•	TECHNOLOGY IS STILL EVOLVING.
O-STORE NEW DATA IN MEUTRAL FILE	•	MEDITAL FORMAT, CAD SYSTEM INDEPENDENT.
AND STORES OF A STANDARD STORES OF THE SECTION OF THE STANDARD STORES OF THE SECTION OF THE SECT		STILL MEEDS OLVELOPING.
STATES OF STATES	2 6	Suna wisement a parent
D-SIORE RER DATA IR REGIDAL FILE F	23	CAN'T BE DOIL
I-EA SOFTWARE APPL. BEST IN 115 CLAS	•	*INTEGRATION #1551MG.*
C-EA SOFTWARE APPL. BEST IN ITS	•	
-11E-EA SOFTWARE APPL. BEST IN ITS CLAS	•	NOME IMPORTANT TO OPTIMIZE ENTIRE DESIGN PROCESS THAN TO MAYE THE BEST
-11E-EA SOFTWARE APPL. BEST IN 175 CLAS	•	DESIGN TOOL IN ITS CLASS.
R-EA SOTIERE APPL. BEST IN 175 CLAS	91	SOFTWARE VERDORS HAVE NOT ABOUT FRAME WORK.
THE TO THE THE PART PART THE TAR THE TERMS	= :	APIC CONTENT ALGORITHMS.V.
I-IR SOFTWARE ATTLE BEST IN		TOTAL DESCRIPTION OF THE PROPERTY OF THE PROPE
		AFTER AND CAPITAL OF TOOLS.
T-EDS S/K PERCHASED FROM ONE VENDOR	~	MULTIPLE VENDORS ARE ACCEPTABLE MARK INTEGRATION IS GOOD.
F-HOST S/W PURCHASED FROM ONE	•	VENDORS
-11f-HBST S/W PURCHASED FROM	•	
-11f-MOST S/W PURCHASED FROM ONE	•	CAN'T STANDARDIZE ALL ON ONE SET OF TOOLS TO GET ALL OF THE
-11f-most s/w Purchased from one vendo	• ;	
THE THE TOTAL CHEST STREET AND THE THE TERMS OF THE TERMS		FACE SOFTWARE PACKAGE DIFFERENT. INVOLVES FRODUCT, CAFABILITY, AND
TORESTA THE TORE CLUSTED AND TORESTANDS OF THE PROPERTY AND THE PROPERTY A	70	
	2	
CATEGORY=06-NCM DESIGN ENVIRONMENT		
	RESPONSE	
QUEST10W	NUMBER	COMMENT
32-12A-SYSTEM SPECIFICATIONS	n	"UNCLEAR", MOT SPECIFIC ENDUGH TO ANSWER.
SIEN SPECIFI	•	LITTLE COUPLING BETWEEN SYSTEM REQUIREMENT TOOLS AND LOWER LEVEL TOOLS.
2-12A-SYSTEM SPECIFICATION		TOOLS INMATURE AND SYSTEM SPECIFIC.
2-17A-SYSIEM SPECIFICATION	0 ;	
2-12A-SYSTEM	•	ZOT ZART STANIEZ TOOLS AVAILABLE.
N-120-SYSTEM PARTS	^ <	CTAINTER ABILITATION TO THE LEGISTON THREE AND THE CONTINUES ABILITATION OF THE CONTINUES AND THE CONT
IZE-STOLEN FARI	• ~	PARTITIONING DATES - O'SETTIVES OF SETTIVES. BOTTLY SETTIVES WOLF
TITLE TOTAL CONTRACTOR	•	

PROGRAM . COMMENTS

CATEGORY.OG-MCM DESIGN ENVIRONNENT (CONTINUED)

9UESTION 33-128-SYSTEM PARTITIONING 33-128-SYSTEM PARTITIONING 35-128-SYSTEM PARTITIONING 35-128-SYSTEM PARTITIONING 35-126-SYSTEM PARTITIONING 35-126-AUTOROUTING	RESPONSE NUMBER 16 16 23 23 24	SIMULATION TO A
CHADLOGY SELECTION CHADLOGY SELE	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	AUTONOUTING TOO DIFFICULT FOR MASSES TO USE. DIFFICULTY MOUTING FULL MAND 1. MACH 5. SUME TOOLS BETTER THAM DIMERS. STILL A LOT TO BE LEARNED. FALL SHORT SUPPORTING NEW DENSITY REQUIREMENTS. FROYIDERS UNMILLING TO RELEASE INFORMATION, SEEM TO FEAR EXCLUSION IN LATER STAGE OF DEVELOPMENT OF MEN TECHNOLOGY. FROYIDERS UNMILLING TO RELEASE INFORMATION, SEEM TO FEAR EXCLUSION IN LATER STAGE OF DEVELOPMENT OF MEN TECHNOLOGY. FROYING ANTING ANALIABLE NOW." A DECISION-MAKING TOOL WOULD BE HELPFUL. STILL HAVE A LONG WAY TO GO. FEW YENDORS OFFER. FEW YENDORS OFFER. FOR YENDORS OFFER.
36-12E-SUPPORT MEN FOUNDRIES W/DESIGN KITS 36-12E-OPTIMIZATION OF MANUFACTURING DATA 37-12F-OPTIMIZATION OF MANUFACTURING DATA	2	NOT MEARLY ENDUGHING AVAILABLE. "JUST MOT THERE." "NOT MEARLY ENDUGH INTERCONNECTION, AND NOT ENDUGH DESIGN KITS. DO NOT USE. NOT MANY DESIGN KITS AVAILABLE FOR TECHNOLOGY. EMERGING TECHNOLOGY. CHERGING TECHNOLOGY. CHERGING TECHNOLOGY. CHANT ANY REAL DESIGN KITS YET. "UNCICER", NOT SPECIFIC ENDUGH TO ANSWER. "UNCICER", NOT SPECIFIC ENDUGH TO ANSWER. "WHAT DO YOU HEAN?" BEING ABLE TO HODEL HANUTACTURED PRODUCT DURING DESIGN WOULD LOWER COST AND INCREASE VIELD. NOT DOING ANTHING MITH IT IN MCM'S. "DON'T UNDERSTAND" WHAT OPTIMIZATION OF DATA ENCOMPASSES. LITTLE STATISTICAL INFORMATION AVAILABLE. MECESSARY TO MANAGE DATA SUCCESSFULLY IN ENVIRONMENTAL FOUNDRY.
CATEGORY=07-SELECTING NCM NFG QUESTION 38-17A-DESIGN KITS AVAIL. FROM NFG/VENDOR 38-17A-DESIGN KITS AVAIL. FROM NFG/VENDOR 36-17A-DESIGN KITS AVAIL. FROM NFG/VENDOR	MESPONSE NUMBER 2 6	COMMENT MOST VENDORS DON'T DFFER COMPLETE WITH ALL EDA PLATFORMS. No design Kits vet 10 speak DF.

PROGRAM . COMMENTS

CATEGORY.07-SELECTING MCM MFG (CONTINUED)

15 AVAIL. FROM WIGAVERDOR 19 WEED 10 BUILD IN TABLE-OFF CAPABILIS AVAIL. FROM WIGAVERDOR 20 DOW'T EXIST VEL. 15 AVAIL. FROM WIGAVERDOR 20 DOW'T EXIST VEL. 16 AVAIL. FROM WIGAVERDOR 20 DOW'T EXIST VEL. 17 OFFERED BY MARAFACTURE 20 DOW'T EXPERIENCE WITH ANY MARAFACTURE 20 DOW'T CAM SUPPLY. USE OUR OWN IN- 17 OFFERED BY MARAFACTURE 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL. FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAIL FROM WIGAVERDOR 20 DOW'C CAM SUPPLY. USE OUR OWN IN- 18 AVAINE MICH STANDARD 20 DOW'C CAM SUPPLY CONTINUE COSTS WOW IN- 18 AVAINE SUPPRINT A CONSULTING 20 DOW'C CAM SUPPLY CONTINUE COSTS WOW IN- 18 AVAINE SUPPRINT A CONSULTING 20 DOW'C CAM IN- 18 AVAINE SUPPRINT A CONSULTING 30 DOW'C CAM IN- 18 AVAINE SUPPRINT A CONSULTING 30 DOW'C CAM IN- 18 AVAINE WITH AND WIGHT CONTINUE COSTS WOW IN- 18 AVAINE WITH AND WIGHT COSTS WOW IN- 18 DOW'C COSTS WOW IN- 18 AVAINE WITH AND WITH COSTS WOW IN- 18 DOW WITH WITH WITH COSTS WOW IN- 18 DOW'C COSTS WOW	C C C C C C C C C C C C C C C C C C C
10-DESIGN KITS AVAIL. FROM MEGVENDOR 19 10-DESIGN KITS AVAIL. FROM MEGVENDOR 20 10-DESIGN KITS AVAIL A CONSULTING 20 10-DESIGN KITS AVAIL A CONSULTING 20 10-DESIGN KITS AVAIL A CONSULTING 20 10-DESIGN KINT AND A CONSULTING 20 10-DESIGN KINT AND A CONSULTING 20 10-DESIGN KINT A CONSULTING 20 10-DESIGN KINT AND AND A CONSULT	. CCMOLOGY. COSTS OF CP.
74-DESIGN KITS AVAIL, FROM MIG/VENDOR 20 74-DESIGN KITS AVAIL, FROM MIG/VENDOR 22 74-DESIGN KITS AVAIL, FROM MIG/VENDOR 22 78-MIG REPURATION/EXPERIENCE/RECORD 10 70-MIG REPURATION/EXPERIENCE/RECORD 22 70-MIG REPURATION/EXPERIENCE/RECORD 10 70-MIG REPURATION/EXPERIENCE/RECORD 22 70-MIG REPURATION/EXPERIENCE/RECORD 10 70-MIG RECURRING COST OF PRODUCTION 10 70-MIG REMING COST OF PRODUCTION 10 70-MIG RE	COSTS OF CORV.
78-MC SIGN WILS NAME - TO SECURE SECOND 10 78-MC REPUTATION/EXPERIENCE/RECORD 10 79-MC REPUTATION/EXPERIENCE/RECORD 10 70-MC REPUTATION/EXPERIENCE/RECORD 10 70-MC REPUTATION/EXPERIENCE/RECORD 10 70-MC RECORDING COST OF PRODUCTION 10 70-MC CURRING COS	CCHOLOGY. COSTS OF CS ARC UP, ARNING CURV
78-MTG METUTATION/EXPERIENCE/ACCORD 70-MTG METUTATION/EXPERIENCE/ACCORD 71-MTG METUTATION/EXPERIENCE/A	COSTS OF CORV
18-WG REPUTATION/CRPERIENCE/RECORD 19-WG REPUTATION/CRPERIENCE/RECORD 19-WG REPUTATION/CRPERIENCE/RECORD 19-WG REPUTATION/CRPERIENCE/RECORD 19-WG REPUTATION/CRPERIENCE/RECORD 19-WG REPUTATION/CRPERIENCE/RECORD 19-WG REPUTATION/CRPERIENCE/RECORD 10-WG REPUTATION/CRPERIENCE/RECORD 10-WG RECURRING COST OF PRODUCTION 10-BCCURRING COST OF PRODUCTION 10-	CCHOLOGY.
10-WIG REPUIATION/EXPERIENCE/RECORD 10-WIG REPUTATION/EXPERIENCE/RECORD 119-WIG REPUTATION/EXPERIENCE/RECORD 120-WIG REPUTATION/EXPERIENCE/RECORD 110-WIG REPUTATION/EXPERIENCE/RECORD 110-WIG REPUTATION/EXPERIENCE/RECORD 1110-WIG REPUTATION/EXPERIENCE/RECORD 1110-WIG REPUTATION/EXPERIENCE/RECORD 10-WIG REPUTATION/EXPERIENCE/RECORD 10-WIG RECURRING COST OF PRODUCTION 10-WIG COST OF	
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C	, At 3
DO-BICCHRING COST OF PRODUCTION 10-BICCHRING COST OF PRODUCTION	, & 3
CHICKENING COST OF PRODUCTION	T GO DOWN UNTIL VOLUMES ARE UP, ECOMONIES OF SKILL. DRIVE DOWN COST ON LEARNING CURV
DO	ECOMDNIES OF SKILL. Drive down cost on Learning
Do-accurating cost of production Do-accuration Do-accu	ECOMONIES OF SKILL. Drive down cost on Learning
10 10 10 10 10 10 10 10	ECONOMIES OF SKILL. Drive down cost on Learning
10 - RECURRING COST OF PRODUCTION	DRIVE DOWN COST ON LEARNING
170-RCCURRING CUST OF PRODUCTION 19 COST TOO MIGH. 170-RCCURRING COST OF PRODUCTION 20 "MC"RE IN A LEARING PROCESS." 210-RCCURRING COST OF PRODUCTION 22 NOT IMPORTMAT, RAD CO. 23 NOT IMPORTMAT, RAD CO. 24 NOT IMPORTMAT, RAD CO. 25 NOT IMPORTMAT, RAD CO. 26 NOT IMPORTMAT, RAD CO. 27 NOT IMPORTMAT, RAD CO. 28 NOT IMPORTMAT, RAD CO. 29 NOT IMPORTMAT, RAD CO. 29 NOT IMPORTMAT, RAD CO. 20 NOT IMPORTMAT, RAD CO. 21 NOT CALLE SHOW THE A CONSULTING 21 NOW-RCCURRING SUPPORT & CONSULTING 22 NOT RECURRING COST SHOULD BE LESS TH NUMBER CONTESTED OUT THEIR 23 NOW-RCCURRING COST SHOULD BE LESS TH NUMBER CONTESTED OUT THEIR 24 NOW-RCCURRING COST SHOULD BE LESS TH NUMBER CONTESTED OUT THEIR A GROUP COST SHOULD BE LESS TH NUMBER CONTESTED OUT THEY A STANDARD, THEY'RE A GROUP CAD FRANTENDRE INITIATINYE (CTI) 25 NOT REALLY A STANDARD, THEY'RE A GROUP CAD FRANTENDRE INITIATINYE (CTI) 26 NOT REALLY A STANDARD, THEY'RE A GROUP CAD FRANTENDRE INITIATINYE (CTI) 27 NOT REALLY A STANDARD, THEY'RE A GROUP CAD FRANTENDRE INITIATINYE (CTI) 28 NOT REALLY A STANDARD, THEY'RE A GROUP CERTIFICATION. NEED THAT CAN THEN THEY CONTESTED OUT THAT CAN THEN THEY CONTESTED OUT THAT CAN THEN THEY CONTESTED OUT THAT CAN THEN THAT CAN THAT CAN THAT CAN THEN THAT CAN THAT CAN THAT CAN THAT CAN THEN THAT CAN THAT CAN THAT CAN THAT CAN THAT CAN THAT CAN THEN THAT CAN THA	DRIVE DOWN COSY ON LEARNING
170-RECURRING COST OF PRODUCTION 171-REGIME SUPPORT & CONSULTING 171-REGIME OF THE SUPPORT & CONSULTING 171-REGIME OF THE SUPPORT & CONSULTING 171-REGIME SUPPORT & CONSULT & CONSUL	
170-RECURRING COST OF PRODUCTION 22 NOT IMPORTED, RED CO. 170-RECURRING COST OF PRODUCTION 23 NOT IMPORTED, RED CO. 170-RECURRING COST OF PRODUCTION 23 NOTE IN SOURCE CONSULTING 23 NOTE CONTING DOWN. 24 NOT IN SUPPORT & CONSULTING 25 NOT CONTONING THE PRODUCTION 26 NOT CONTONING THE PRODUCTION 27 NOT RECURRING COST SHOULD BE LESS IN 28 NOT RECURRING COST SHOULD BE LESS IN 29 NOT RECURRING COST SHOULD BE LESS IN 20 NOT RECURRING COST SHOULD BE LESS IN 20 NOT RECURRING COST SHOULD BE LESS IN 21 NOW BE CONNEW IN ITALIANY (CFI) 21 NOT REALLY A STANDARD, THEY'RE A GRO 27 NOT REALLY A STANDARD, THEY'RE A GRO 28 NOT REALLY A STANDARD, THEY'RE A GRO 29 NOT REALLY A STANDARD, THEY'RE A GRO 20 NOT REALLY A STANDARD, THEY'RE A GRO 20 NOT REALLY A STANDARD, THEY'RE A GRO 21 NOT REALLY A GRO 21 NOT REALLY A STANDARD, THEY'RE A GRO 21 NOT REALLY A	
170-RECURRING COST OF PRODUCTION 22 NOT IMPORTNAT, RAD CO. 170-RECURRING CUST OF PRODUCTION 23 FRICE IS NOW COMING DOWN. 171-CHGINKERING SUPPORT & CONSULTING 171-CHGINKERING SUPPORT & CONSULTING 172-CHGINKERING SUPPORT & CONSULTING 173-CHGINKERING SUPPORT & CONSULTING 174-CHGINKERING SUPPORT & CONSULTING 175-CHGINKERING SUPPORT & CONSULTING 176-CHGINKERING SUPPORT & CONSULTING 177-CHGINKERING SUPPORT & CONSULTING 176-CHGINKERING SUPPORT & CONSULTING 176-CHGINKERING SUPPORT & CONSULTING 177-CHGINKERING SUPPORT & CONSULTING 177-CHGINKERING COST SWOULD BE LESS TW 177-CHGINKERING COTT THE THE TOWN THE THE THE TOWN THE	
176-RECURRING CUST OF PRODUCTION 176-RECURRING SUPPORT & CONSULTING 176-ENGINCERING COST SHOULD BE LESS THE NON-RECURRING COST SHOULD BE LESS THE NON-RECORD THE TRANSPORTED SUPPORT OF THE TRANSPORT OF	
-17E-ENGINEERING SUPPORT & CONSULTING -17E-ENGINEERING COST SHOULD BE LESS TH TEGORY=08-DATA EXCHANGE STANDARD TEGORY=08-DATA EXCHANGE AND THEY RE A GRO THEORY THEO	
-17E-ENGINEERING SUPPORT & CONSULTING -17E-ENGINEERING COST SHOULD & ELESS IN RESPONSE RECORNENT COST SHOULD & LESS IN RESPONSE RANEWORK INITIATINYE (CF1) -18A-EAD FRANEWORK INITIATIATINYE (CF1) -18A-EAD FRANEWORK INITIATINYE (CF1) -18A-EAD FRANEWORK INITIATIATINYE (CF1) -18A-EAD FRANEWORK INITIATIATINYE (CF1) -18A-EAD FRANEWORK INITIATIATIATIANEWORK (CF1) -18A-EAD FRANEWORK (CF1)	
-17E-ENGINEERING SUPPORT & CONSULTING 19 NON-RECURRING UN- -17E-ENGINEERING SUPPORT & CONSULTING 19 NON-RECURRING CONTENTS OF	I THEIR BESINESS RODELS, AND SUPPORT WILL
TECONY DB-DATA EXCHANGE STANDARD TECONY DB-DATA EXCHANGE STANDARD TECONY DB-DATA EXCHANGE STANDARD TECONY DB-DATA EXCHANGE STANDARD TO DB-CAD FRANKWORK INITIATINYE (CFI)	
ESTION 100-DATA EXCHANGE STANDARD 100-DATA EXCHANGE STANDARD 100-DATA FRANEWORK INITIATINVE (CFI) 100-CAD FRANEWORK INITIATINVE (CFI) 100-CAD FRANEWORK INITIATINVE (CFI) 100-CAD FRANEWORK INITIATINVE (CFI) 100-DATA FRANEWORK INITIATINVE (CFI) 100-CAD FRANEWORK INITIATINVE (CFI)	Z Z Z
ESTION -18A-CAD FRANCENORK INITIATINVE (CFI) -10A-CAD FRANCENORK INITIATINVE (CFI)	
LSTION	
-18A-CAD FRANKUORK INITIATINVE (CFI) 13 NOT READY FOR C	
-188-CAD FRANCENDER INITIATINAL (CF1)	
-18A-CAD FRANCENCER INTITATINAE (CFI) 5 HAVEN'T PROUCE -18A-CAD FRANCENCER INTITATINAE (CFI) 6 VERY SCOW IN 12 DE -18A-CAD FRANCENCER INTITATINAE (CFI) 8 STANDARD GOOD, -18A-CAD FRANCENCER INTITATINAE (CFI) 13 NOT REAVY FOR C	48043
-10A-CAD FRANCIOR INITIATING (CFI) 6 VERY SLOW IN 12 CFI) 12 STANDARD GOOD, 18A-CAD FRANCIORK INITIATING (CFI) 8 STANDARD GOOD, 18A-CAD FRANCIORK INITIATING (CFI) 13 NOT READY FOR C	
-16A-CAD FRANCEORK INITIATINE (CT1) B STANDARD GOOD, -16A-CAD FRANCEORK INITIATINE (CT1) 13 NOT READY FOR C	
-16A-CAO FRANCEORK INITIATINEE (CF1) 13 NOT READY FOR C	HORBS EDT SUPPORTING WELL.
	MEED TIME FOR VENDORS TO IMPLEMENT.
0101/120010 0100/010010	
100 . 120 . 200	NO USEFUL UNTIL VENDORS SUPPORT.
No. 1. 1. 1. 1. 1. 1. 1.	
CON 61 CONTRACTOR CONT	
LOW SUCCESSION TO SELECT THE SELE	DOES NOT SUPPORT MEN NOW.
NO STANDARDS YET.	

CATEGORY.08-DATA EXCHANGE STANDARD (CONTINUED)

9UE 5 1 1 0 M	RESPONSE	COMMENT
1	•	TITE SELLINGS COLUMN
- 116-	٠.	
45-100-1005	n (CANNEL CHOCKET TRANSLA
45-166-1665	~ 1	
10 E	~	
-186-166	• •	THE SELLINGS SHILL SELLINGS SHILL SELLINGS SHILL SELLINGS SHILL SH
֓֞֝֝֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֡֓֓֓֓֓֡֓֓֡֓		DUES NOT SUPPORT MEM MOW.
100-101	; ~	SHOULD BE REPLACED.
-	•	
7	1	RIGHT INFO CONTENT, BUT NOT USEFUL UNTIL VENDORS SUPPORT.
٦,	11	NOT FAMILIAR MITS.
	• -	DN S
7	19	NO OME HAS COIF STAMDARDS.
46-100-6015	23	NOT REAL TIME TO US.
47-196-196-350	^	NOT FABILIAR MIT.
0E-1PC-3	•	SHOULD BE REPLACED.
1 - 1 PC	•	NO SIGNIFICANT VENDORS AND SUPPORTING.
	•	-
-	10	NOT FABILIAR WITH.
341-38	1.4	
7	7.	CALARCEMENT AND OFFCROE RELOTED FOR NOW.
47-186-186-350	19	O.S. I RECEEDED IN 100
40-10f-GERBER	m 1	***************************************
40-101-GEAGER	Λ.	STOCIO DE SELECTO. GEORGE SERVICE COLORIS SERVICES SERVIC
40-10f-CERBER	~ •	CALLER BY COUNTY OF THE CALLER
49-106-56868	~ (CENTRAL ACTION OF THE PROPERTY AND THE P
-	- :	TOUR TRADEGUATE FOR ELECTRICAL NUMBER OF STREET
-10f-GERBER	•	
-16G-G051f ST	4	ATED FORMAT.
-196-60511	`	INTERVISE IN THE INTERVISE NOT INTORIANT EXCEPT FOR THIS FILM ON
-106-60511	•	
-186-60511 ST	•	. BU1
9-18G-GDS11 SIME	•	F 0 P
9-1	, "	
7	n sr	. OUTDATED FORMAT.
7		MONE THAN
- 11 0 1 - 0		HCH'S.
	•	100
	•	CONTENTS INADECUALE FOR ELECTRICAL BULE VERIFICATION.
>0 - 1 cm - 0 x 2	•	
CATEGORY=10-DESIGN TOOLS		
QUES110#	RESPONSE	COMMENT
,	•	FASTRIC CORTES CARRIOS CARRIOS DESIGN ANCE.
SFOR	~ -	ETELDS EER STAILOR, CADENCE ALLEGNO STAILOR
72-94-100LS FOR CAL	· •	DAZIN
:: :: :: :: :: :: :: :: :: :: :: :: ::		
PROGRAM # COMMENTS		

CATEGORY=10-DESIGN TOOLS (CONTINUED)

COMMENT		DON'T REGARD AS SETARATE FROM CAD MENIOR GRAPHICS, CAUAN	SAME AS CAD. JUST BROADER TERE	QUATAL LABORATORIES, THERMAL PACKAGE PACIFIC MUMERICS	NOT SOME THAT TERM INCLODES.	TARRIS EDA, KENTOR GRAPHICS SOTTEARE	MENTOR GRAPHING CANADAN AND STATEMENT OF STA	SUNSPAR SYSTEM MENTOR, COPPER CHYAR ERRANGERET		DEA 3D ANALYSIS TOOLS, TANGO, VERILOG, M SPICE, LINE SIS PROBE	SEE IN TOURS SANTER	CADESCE ALEGEO. MENTOS BOARD STATION NOO	"HOST PEOPLE SEE CAE & CAD AS SAME ACTIVITY." CAD INTERCHANGEABLE WITH	CAE-(MENTOR MCM STATION, CADENCE ALLEGRO STATION).	SECURE AIMPORE	TACKEL VISCLE, REXION GRAFFICS, ECK WINION	CADING NEW ARRIGATOR FOR A ALAB ARTIGMAN TODAS	CADENCE, MENIOR GRAPHICS, MARRIS EDA	MENIOR GRAFMICS, AUTOCAD	HARRIS EDA FINESSE	SPICE, PC BASED 10015, PCAD, AUTOCAD DERIVATIVES	ERECTOR TERESTS TERESTS TO SERVER	TINGS	HARRIS EDA, MEMIOR GRAPHICS	EMERICA GARATION, LARANG TIRESON	TERIOR, INCOMEND. TARREN, INCOMENTE TERESTORIES	DOTAL OF THE TRANSPORT OF THE THEORY OF THE THEORY OF THE THE THEORY OF THE THE THEORY OF THE THE THEORY OF THE THEORY OF THE THEORY OF THE THE THEORY OF THE THE THE THEORY OF THE THEORY OF THE THEORY OF THE THEORY OF THE	HARRIS FINESSE, IC EDITORS, LAYDUT, DRC, LVS			OLS UNDER WINDOWS	CONFUTENTION		COLST ARGEBRATE TAGE CAC	TITATOR GENTALITY, AUTOGRO	TABLICAS LEDY TALLICAL VEHACUTICS STREET	STREET CONTRACTOR THE CASE OF THE STREET	NOT DEFINED, USE MANY	AUTOCAD
RESPONSE	W 40 K	10 6.	01	13	4 40	24	• •	20	22	23	4 4			•	•	10. 1	o ~	•	•	10			16	1.7		P. I.	2.2	23	2.4	25	•	•	~ 1					• •	16
9U[5710M	9A-T00LS F0 9A-T00LS F0 9A-T00LS F0	2-9A-100LS FOR 2-9A-100LS FOR	-9A-100LS FO -9A-100LS FO	2-9A-100LS FOR	-9A-1001S FO -9A-1001S FO	2-9A-TOOLS FOR	-9A-1001S FOR	2-9A-100LS FOR	2-9A-TOOLS FOR	2-9A-100LS FOR	2-9A-10015 FOR	3-98-10015 FOR	3-98-100LS FOR	3-98-100LS FOR	3-98-10015 FOR	3-98-10015 FOR	3-96-10015 10H	3-98-100LS FOR	3-98-TOOLS FOR	3-98-100LS FOR	3-98-10015 FOR	3-76-1001S 108	3-98-1001 - FOR	3-98-T0015 FOR	3-98-10015 FOR	3-98-10015 FOR	3-76-100L3 70M	3-98-10015 FOR	3-98-1001S FOR	3-98-10015 FOR	4-9C-100LS FOR	4-9C-10015 FOR	4-9C-10015 FOR	-9C-10015 FOR	9C-10015 FOR	-9C-10015 FOR	78-46-1001S FOR CAR	4-9C-100LS FOR CA	-9C-1001S FOR C

CATEGORY*10-DESIGN 100LS (CONTINUED)

COMMENT	NOT USING NOW, BUT WILL USE INTERGRAPH.	AUTO CAD	OKN IN HOUSE SYSTEM	IN PROCESS DEVELOPMENT	PC CERBER, ASK 600	ONE IN HOUSE SYSTEM	ALLEGRO	CADENCE DESIGN FRANCEDRK 11 & VALID FRAME, MENTOR FALCON FRANCEDRK	SAME AS CAE-(MENIOR MEN STATION, CADENCE ALLEGRO STATION). NOTHING	"SITS ON TOP OF " INCIR MENTOR OR CADENCE.	N. U.D.	MERICA CHAPILICS	CADENCE TOOLS	CADENCE, 18H 10DLS	CADENCE, MENTOR	APOLLO	CADENCE	DN DRDER	MENTOR	MOTOROLA		Integrate States	TOR CAD - MENIOR GRAPHICS, HARRIS TINESSE. FOR MANUTACTURING - CUSTON	DESIGN SYSTEM.	18M & CFI COMPATIBLE SYSTEM	MIL SPECS	ONN IN MOUSE SYSTEM	CADENCE, IBM 6000
RESPONSE	S FOR CAM 17	TOR CAM	FOR CAR	£0.			101	S FOR OVERALL 2									_		S FOR OVERALL 13		5 FOR DYCRALL 16		S FOR OVERALL 10	S FOR OVERALL 10	FOR OVERALL	S FOR DVERALL 20	S FOR DYCHALL	S FOR OVERALL 25
QUEST10M	74-9C-100LS	74-96-10015	74-9C-T00LS	74-90-10015	74-9C-T00LS	74-9C-100LS	14-9C-100LS	15-90-10015	75-90-10015	15-90-10015	75-90-10015	15-90-10015	15-90-10015	15-90-10015	15-90-10015	75-90-10015	75-90-10015	75-90-10015	75-90-10015	13-90-10015	75-90-10015	75-90-100LS	75-90-10015	75-90-10015	75-90-10015	15-90-10015	75-90-10015	75-90-10015

CATEGORY=11-OVERALL SATISFACTION

90[ST 1 0 N	RESPONSE	COMMENT
79-19-OVERALL SATISFACTION	~	ABIE 10 COMPLETE A 101 WITH MEM TECHNOLOGIES, BUT IT MAS POTEMITAL 10
79-19-DVERALL SATISFACTION	~	BE FAR MORE PRODUCTIVE.
	n	CURRENT ENVIRONMENT MAS PROVEN VERY EFFECTIVE, BUT BETTER TOOLS AND
	n	PROCEDURES WOULD MAKE IT MO!, PRODUCTIVE.
	•	*11 *COECS-11 *
	•	HAVE GOOD POINT SOLUTIONS; BUT INTEGRATION, COLLABORATIONS,
79-19-OVERALL SATISFACTION	•	TEITODOLOGIES & INTERSTRUCTURE ARE LACKING.
79-19-DVERALL SATISFACTION	•	MCW DESIGN & FABRICATION IS FEASIBLE; DOING A FAIR ANDUNT OF IT. "WOULD
79-19-OVERALL SATISFACTION	•	BE CASIER IF TOOLS RERE FURTHER ALONG."
79-19-OVERALL SATISFACTION		"MY SATISFACTION WILL BE LOW UNTIL STANDARDS ARE DEFINED AND TOOL KITS
79-19-DVERALL SATISFACTION	•	ARE AVAILABLE." HAVE MADE PROGRESS IN EDUCATING PEOPLE IN NCH
79-19-OVERALL SATISFACTION	^	TECHNOLOGIES AND CHANGES REQUIRED TO DESIGN AND MANUFACTURE, BUT
79-19-OVERALL SATISFACTION	•	"STILL MAVE A LONG WAY TO GO."
79-19-DVERALL SAFISFACTION	•	"WE CAN DO MOST OF THE BASICS," BUT CAN'T DO THEM WITH THE FULL HANGE
19-19-OVERALL SATISFACTION	••	OF DESIMED CAD 1001S ON WITH THE VARIETY OF VENDORS DESIMED.

SATISFACTION	
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ONY = 13	
GORVELL	
EGORY = 13	
TEGORY=11	
CATEGORY=11-0	

	RESPONSE	COMMENT Doing too many things at one time. Meed to marrow focus.
-	9	
79-19-OVERALL SATISFACTION	11	THEY ARE LACKING TOOLS THAT WOULD MAKE FOR GREATER EFFICIENCY. MEED TO
79-19-OVERALL SATISFACTION	11	MAKE SOME PURCHASES.
79-19-OVERALL SATISFACTION	13	FICELS THEIR MEEDS FOR DESIGN AND ANALYSIS ARE BEING FILLED, " NO
79-19-OVERALL SAIISFACTION	13	HOLES THERE. " FEELS THEY ARE WORKING EFFICIENTLY.
79-19-DVEHALL SATISFACTION	•	MATURITY WILL BRING NEEDED IMPROVENENTS TO THEIR NEW ENVIRONMENT.
79-19-OVERALL SATISFACTION	16	MARTIN MARIETTA MAS INVESTED HEAVILY ON CONCURRENT ENGINEERING TOOLS
19-19-DVEHALL SATISFACTION	16	WHICH ARE PAYING OFF.
79-19-OVERALL SATISFACTION	17	THE PRODUCT DESIGN IS COMPLEX. OVERALL, ADMINISTRATIVE AREAS ARE THE
79-19-GVERALL SATISFACTION	17	REAL PROBLEM.
	•	FOUNDRY DOES NOT CURRENTLY SUPPORT ENGINEERING DESIGN.
19-19-UVERALL SAIISFACTION	19	HAVE BEEN USING & DEVELOPING FOR 15+ VEARS. WE MAVE PROVEN DESIGN AND
19-19-OVERALL SATISFACTION	19	DEMO OF 1ST TIME PASS.
79-19-OVERALL SATISFACTION	20	"ME'RE THE LEADER IN DEVELOPING TECHNOLOGY." BUT STILL MAYE ROOM AND
79-19-OVERALL SATISFACTION	20	
79-19-OVERALL SATISFACTION	2.2	ICCHNOLOGY & 1001S ARE MODERATELY DEVELOPED BUT MAKING STEPS. MATURITY
79-19-OVERALL SATISFACTION	2.2	OF TOOLS AND DUR OWN EXPERTENCE ARE MOVING UP ON THE LEARNING CURVE.
	23	"ME CAN DO WORK WITH TOOLS WE HAVE, BUT IT'S VERY MARD."
79-19-0VERALL SATISFACTION	24	TECHNOLOGICAL IMPROVEMENT NEEDED.
79-19-OVERALL SATISFACTION	2.5	"EMBODIES STRICT ENGINEERING SUPPORT."

COMMENT

RESPONSE

DESCRIPTION

MAYO CLINIC		RATINGS DAG OPCEATIONS	EARRIN GOOFFEET AFRONDACE SAN DIV		USC-151-MOS1S	ANONYMOUS	RARRIS SENICONDUCTOR	ARONYMOUS	EASTMAN KODAK	201020LA	MANTIN MARIETTA	ACUSTAR	TEXAS INSTITUTENTS		MUGHES	CHARLES DRAFER LABS	INTERCETTY SYSTEMS INC	SALL ELECTRONICS	WO TO BOLA	"USERS NEED TO WORK WITH NEW AND CAP VENDORS ON STANDARDIZATION AND	INTEGRATION."	"SOUNDS LIKE YOU NORK FOR MENTOR GRAPHICS."	"MAVE OF THE FUTURE."	FEELS THAT AMALYSTS SHOULD NOTE ANY EFFECT THERE MIGHT BE ON MIS		THE CAND MICH O VENDOMS WEED TO WORK HANDER ON COST CONTROLS. MEED TO	SALK LEAST STREET TO THE TOTAL STREET TO THE TAX STREET TO THE STREET TH	NELOS BEGGER TOSM ON SILICON VENDOM TO DELINEM TESTED DIE N. 1951.	CONTINUE OF AND MORE OF THE STATE OF THE PROPERTY TO REFE		MCW IS IN 11S INFANCY, BUT BUSINESS IS DOUBLING YEAR TO YEAR AND WILL	BE SUCCESSFUL AS TECHNOLOGY ADVANCES.	"WANT AND HOPE MEM WILL DO WELL SO WE CAN SELL PRODUCT."	REALLY PRESSED TO FIND OUT THE ORIGINATOR OF THE SURVEY. FOUND	GUESTIONS 7 (8 THROUGH 14 ON REPORT) AND 12 (32 THROUGH 37 ON REPORT) 100	CONFUSING TO ADDRESS. DID NOT ASK QUESTION 17 (38 THROUGH 42 ON REPORT).	PARTICIPANT'S FIRM IS AN MCM MANUFACTURER. TWEIR FIRM MAS SOME KIND OF	INVOLVENCE AT PRESENT WITH ARPA, SOME FUNDED PROJECT.	DID NOT ASK QUESTION 17-(50 THROUGH A2 ON REPORT), PARTICIPANT IS	PROTOTYPE DEVELOPER.	FOUND THE EXAMPLES CITED IN 118 (NUMBER 27 IN REPORT) TO BE IN CONFLICT	WITH THE DESCRIPTION OF THE CAPABILITY. HE WOULD LIKE A COPY OF THE STUDY	WHEN IT IS COMPLETE, IF POSSIBLE.	0 > 1 2 4 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
~ .	^	•	•	^	•	•	2	11	13	-	16	11	7.	13	20	22	23	7.	52	~	~	•	•	-	• ;	= ;	7		: =	: :	23	23	7.	~	n	•	~	m	•	•	•	•	•	•

COMENT	REFORT) IS REDUNDANT. ME WOULD LIKE TO RECEIVE A COPY OF THE STUDY WHEN IT IS COMPLETE. PRESSED "HARD" FOR ME TO CONFIRM THAT I WORKED FOR MARRIS CORPORATE NEADQUARTERS AS MIS TELEPHONE INDICATED. GLENN PETERSEN SAID ME WILL CALL MR. SALATINO THIS PM TO SMOOTH THE WAY FOR REMAINDER OF SURVEY.	RE-CONTACTED MR. SALATING AFTER MR. PETERSEN'S CALL, WENT SMOOTNLY. TWIS COMPANY MANUFACTURES MCM'S, SO QUESTION 17 (38 TMROUGH 42 IN REPORT)IS MOT APPLICABLE. MR. GATES WOULD LIKE A COPY OF FINAL SURVEY WHEN COMPLETED.
RESPONSE	••••	0 0 0 0
06568171108	SCVERYER COMMENTS	

89:25 HONDAY, DECEMBER 6, 1993

			HEAN	HEAN	HEAN	
C > 1 C C C S - 1	QUESTION	ac sponses	L I	8 A T	•	
TOTAL STREET,	01:05A-DESTG8	~	10.0	9.0	9. 0	
		-	10.0	٥, ٥	٥.	
	SALDS SOLICABLE	-	30.0	0 .	D. C	
	DA. DST. FEGINE SUPPORT	-	10.0	•	2.0	
	07-05G-CONSULTING SERVICES	-	9 .0	7.0	-1.0	
	PRESTANCE NOTE NOTE AND A COLUMN TO SERVICE AND A COLU	•	•	7.0	1.0	
DA-DESIGN/MIG OF NCH >	CONTRACTOR SOLVEN SOLVEN STATES AND STATES	•		9	•	
	710 mid (4117)	, ,				
		•				
	25-100-ACCESS TO CHIP & COMPONENT DATA	~			•	
	24-10E-DESIGN MEIKODS TO INFLEMENT MCM'S	•			۲.۶	
	25-10F-AUTOMATED TESTING & QUALITY METHODS	~	v.	•	٥. ٥	
	THE SERVE STREET STREET	•		9.0	4.3	
95-CAPABILITIES	Merical Control of the Control of th					
	ANTING-DESCRIPTION OF A DISCREPANCE.	•			2.3	
	MAINTENANT OLOVONIA ANGRE BIRLING ATTEN	` -		•		
	24-110-STOSE SCH DATA IN MECINAL TILL THE	•				
	SO-11E-EA SOFTWARE APPL. BEST IN ITS CLASS	•	•	•	`	
	SI-11F-MOST S/W PURCHASED FROM ONE VENDOR	•	-	•	-	
		•		6.7	2.7	
OF-REE DESIGN ENVIRONMENT	STORES			6.7	2.0	
		٠.		•		
	34-12C-ACTOROCTING	٠,				
	35-120-PACKAGING TCCHNOLOGY SELECTION	٠.	•			
	36-12E-SUPPORT NCM FOUNDRIES W/DESIGN RITS	•	D. (•		
	37-12F-OFTIMIZATION OF MANUFACTURING DATA	~	70.0 70.0	· ·	۲.۶	
į	SCOREA/SER TORSE SPEED TO THE	•	•	6.3	2.3	
67-SELECTING NEW NIG	the tree broken and referenced Appropries	•		•	0.3	
	AND THE STREET OF THE STREET OF THE STREET	•	0	7.5	1.5	
	AG-1/C-1/CARGLOS- OL-FRED B- STREET C-1::	,	1.7	9.0	7.7	
	AL-LOCATION COST OF TRACES	•	•	7.5	9.0	
	AZ-1/6-[MG:MK-RING OGLICA: A CONSOLITA	•))		1	
	CFI) JAMINET TERRESON TERRESON CFI	•	7.0	8.8	1.5	
OR-DATA EXCHANGE STANDANDS	ANTHORNESS TANDERS TANDERS TO THE TA	~	7.0	5.0 .0	2.0	
		•	7.5	0.	1.3	
		. ~	7.0	5.1	1.3	
		~	o. •	3.3	2.5	
		•	•	7.0	1.0	
	40-100-01-01-01-01-01-01-01-01-01-01-01-0	~	9.3		6.7	
		^	7.3	6.3	1.0	

CATEGORY	801101	RESPONSES	HEAH	MEAN SA 7	HEAH BAP	
61-CORSIDERING RCH 1CCH.	61-65A-016168	•	10.0	• •	1.0	
HUH	•		10.0	5.0	٥. ٥	
NCH TECH	•	-	20.0	٠.	٦.0	
	D6-DSF-ENGINECAING SUPPORT	-	10.0	•	۵. ۲	
04-DESIGN/HFG OF HEN'S	23-100-ACCESS TO CHIP & COMPONENT DATA	~	10.0	9. 0	5.0	
O6-MUM DESIGN ENVIRONMENT	37-12f-OPTIMIZATION OF MANUFACTURING DATA	~	10.0	7.5	2.5	
87-SELECTING NEW ATG	N	•	9.8	7.5	۵.۷	
DA-DESIGN/RFG OF MCR'S	•	•	4.4	•	1.3	
E U	•	~	n. 6	6.3	2.0	
	•	~	4.0	٥. ٥	٠.٧	
DE-MEN DESIGN ENVIRONMENT	•	~	9.3	6.1	7.7	
DA-REN DESIGN ENVIRONMENT	35-120-PACKAGING TECHNOLOGY SELECTION	~	9.8	7.0	2.3	
CRCHAN		~	9.3	8.7	٠.	
04-0[Sign/Hrg of HCH'S	22-18C-STANDANDS DATA TRANSFER-DESIGN/NFG	~	9.0	5.3	3.1	
BA-NCH DESIGN ENVIRONMENT	34-120-46108067186	~	٥.	•	9.7	
065162	•	•	9.0	• •	9.0	
87-SELECTING MCM M/G	•	•	0 .	7.9	1.5	
DA-DESIGN/NTG OF NEW S	0	~	•	7.0	1 .	
	21-108-INTEGRATION OF DESIGN TOOLS FOR NCM	•	•.	•	• •	
	•	•	•	6 .9	2.3	
B6-MCH OCSIGN CRYINGHENT	33-128-SYSTEM PARTITIONING	~	. .	6 .7	2·0	
D7-SELECTING MCM NFG	-	~		6 .0	2.7	
	•	•	٠.	9.	6.5	
85-CAPABILITIES	29-110-STORE MEN DATA IN MEUTBAL FILE FRHT	^	•	4.1	2.2	
BE-DATA ENCHANGE STANDARDS	47-186-186-350	~	•	3 .8	٤.۶	
BB-DATA EXCHANGE STANDARDS	40-101-SERBER	~	• •	٠.	9 .2	
05-CAPABIL171ES	30-11E-EA SOFTWARE APPL. BEST IN 17S CLASS	•	7.0	7.3	٠.	
DS-CAPABILITIES	•	~	7.7	٠.	۲.۲	
05-CAPABILITIES	28-11C-MOVE DES/DATA ANONG SINILAR APPL.	~	1.1	5.3	۲.۵	
DB-DATA EXCHANGE STANDARDS	•	~	7.3	6.0	1.5	
CACHANGE	50-10x-0xf	~	7.3	6.3	7 · 0	
EXCHANGE	~	•	7.0	5.5	1.5	
EXCHANGE	44-108-STEP/PDES	~	7.0	9.6	2.0	
EXCHANGE	46-180-E01F	~	7.0	5.7	1.5	
8111165	31-11f-MDST S/W PURCHASED FROM ONE VENDOR	•	•	•	•	
DI-CONSIDERING NCW TECK.	01-056-COMSELTING SENVICES	~	9 . 9	7.0	-1.0	

			HEAN	HEAN	MEAN	
CATCGORY		RESPONSES	Ī	SAT	L < 0	
	1511-616-16	-	•	•••	9.0	
	TING INCHEST T ATTLE TO THE TOTAL TO	^	. o .	9 .0	٠.	
	CHIA TOARS ATTOR	•	N. 6	9.0	4.3	
	TOTAL STATEMENT OF THE	•	9.6	5.3	2.1	
S. EUR DE DE TENTO - FO	A-101-01-01-01-01-01-01-01-01-01-01-01-01	•	0.	4.1	N. N	
OS-CAPABILITIES	SOUTH ALIEN TO THE TAKE THE TOTAL TH	•	9.3	6.3	8. S	
	ALLA STEED TO THE FORESTES WINDS ALLS	•	٠.	•	. o	
10 10 10 10 10 10 10 10 10 10 10 10 10 1		^	٧.٧	6.7	2.1	
OF TOTAL STREET STREET	2011020001 10 1000 1010 1010 1010 1010	~	6.7	0 .9	2.1	
ON-SELECTION ACT OF THE	ATTENDED TO BE STORED OF THE STORES OF THE S	~	10.0	7.5	4.5	
CO-SES DIDIES LAVINGERIA		~	•	٧.٧	2.3	
DE-DATA CACRANCE STANDARDS	AVITACISTICATION DECEMBERS SELECTION	~	9.3	7.0	2.3	
DOTAL BLANCE CREATER.	ABLIDA STREETS AVAIL FROM NFG/VENDOR	•	•	6 .5	2.3	
	THE THE PLANT OF A PROPERTY OF THE PARTY OF	^	7.7	8.3	2.3	
		-	10.0	•	3 . 0	
ON THE PROPERTY AND THE PER	ANTICONAL SELECTION SELECTION OF CONSULTING	•	9.3	1.5	8 · 8	
O'-DILITING MEN N'O)	^		•.1	7.0	
DO-NEW DIVISION LAVINGENIA		~	7.0	S. B	7.0	
	TOTAL SOLUTION AND AND AND AND AND AND AND AND AND AN	^	•	7.0	7.	
	CONTRACTOR TO CONTRACT AND THE PROPERTY OF THE	•	9.0	7.5	1.5	
		•	7.0	8.8	1.5	
	S. TOTAL TERRET TOTAL TO	•	9.3	•	1.3	
	ATTOCHOLOGICAL SECTION OF THE SECTIO	•	1.1	6.3	1.3	
		•	7.3	• •	1.3	
COLORIA CACARAGO STATUTO		_	7.0	5.7	1.3	
GG-DATA CACARGE STATUTES		~	10.0	٠.	1 · 0	
di-considering and inch	ANIBER AND TABLE	-	10.0	9.6	0.7	
ON-CORNIGENER ACK - CCA.		~	٥.	o.	0.7	
CO-MICH CLOSES CHARRES		~	0.	7.0	7 0. T	
CONTRACT CACABOOM		~	7.3	6.3		
	AN ACK TOO TO DESTON OF TOOLS FOR NCW	•	•	•	•	
		~	٥.		6.7	
_	ABLICATE ADDITION APPL BEST IN 115 CLASS	•	7.0	7.3	• •	
	10-11-11 BEPETATION/EXPERIENCE/ACCORD	•	. .	•	v. 0	
	THE THE TENED TO THE PERSON OF A PROPERTY OF THE PERSON	•	•	•	.	
dy-fractions and and a	57-540-C0ESELTIZE SERVICES	-	• •	7.0	-1.0	
Line de la company de la						

SATISFACTION AVERAGE RESPONSÉS

500

6.71

89:25 HBNDAY, BECENBER 4, 1995

PROGRAM . STATS

- FUTURE HEM USE

NON-GAP SUMMANY SUNVEY-PERIOD 9512

96 [57]08	1764	FREQUENCY
61-887 USAGE	FUTURE MMT USAG	•
DA-FUTURE ASSEMBLY		~
04-FUTURE COMSULTING SERVICES		~
DA-FUTURE DESIGN		•
64-FUTURE DESIGN SOFTWARE		•
DA-FUTURE ENGINEERING SUPPORT		•
84-FUIURE SUBSIRATE FABRICATION		•
64-fulune iesi		•
OG-FUTURE MEN-C CERANIC LOW TEMP COFIRED		•
O6-FUIUNE NCH-C CERANIC THICK FILM		•
O6-FUIUNE MEM-D THIM FILM ON SILICON ON CERANIC		n
OG-FUIUNE MCM-HDI CHIPS-FIRSI		-
OG-FUIDRE MCM-L LAHIMATE		•
D6-fulung Dinen		7
09-0ESIGN 1001S		•
	707	~ <
		۱ ۸
13-CURRENT ENGINCERING	YES	•
16-INVESTING IN DESIGN AUTOMATION SYSTEMS	EXTREMELY IMPOR- VERY IMPORTANT IMPORTANT	4 N m

CATCORY-01-CONSIDERING NCM TECM.

COMMENT	MO PERSONAL INVOLVEMENT. NO PERSONAL INVOLVEMENT. INFRASTRUCTURE NOT THERE. STILL VERY IMMATURE. MOULD BE EVALUATING HIMSELF. NOT CONFORTABLE WITH.
	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
06654103	03-05C-ASSEMBLY 04-050-1EST 04-050-1EST 06-05F-EMGINEERING SUPPORT

CATEGORY-01-CONSIDERING USING MCM

RESPONSE NUMBER CONNENT	R CERANI 12 "CHIPS & WIRE" APPLICATION UNDERWAY. 12 NOT SURE 1 PROPERTIES OF MATERIALS NOT YET INVESTIGATED. COST IS PRIMARY 1 CONSIDERATION.
	60-60-MCM-D 1414 FILM ON SILICON OR 69-61-MCM-MD1 CH1PS-FIRST 70-67-01MCM

CATEGORY. D4-DESIGN/NFG OF NCH'S

9 0£5110m	RESPONSE	COMMENT
20-108-DESIGN AUTOMATION SOFTWARE	2.7	FIME FOR DIGITAL.
21-108-121EGBATION OF DESIGN 10015 FOR MCM	21	STILL MORKING ON 11.
22-16C-STANDARDS DATA TRANSFER-DESIGN/NFG	21	MOT WELL DEVELOPED VET.
22-10E-51ANDADS DATA TRANSFER-DESIGN/NFG	3.7	MEVER AS TRANSPARENT AS PEOPLE CLAIM.
21-100-ACETS 10 CETP & COMPOSEST DATA	21	NARD TO COME BY.
23-100-ACCESS TO CRIP & COMPONENT DATA	2.7	VENDORS NOT SET UP. MUST CHASE DOWN PRODUCT ENGINEERS AND MANAGERS
23-100-AEEES TO CEIP & COMPOSENT DATA	2.7	TO ACQUIRE INFORMATION.
25-10f-Automated resting & DUALITY METHODS	27	ABILITY TO ACCUIRE KNOWN GOOD DIE, NO GOOD SOLUTION. FIXTURING IS A
25-10F-AUTOMATED TESTING & QUALITY METHODS	27	PROBLEM WITH DIGITAL AMALOG ON IT'S OWN.

CATEGORY.05-CAPABILITIES

	21 STILL MOT FULLY DEVELOPED VET. 27 MOT AS TRANSPARENT AS PEDPLE CLAIM. 28 MOT DEVELOPED WELL. 21 NOT AWARE IT CAM BE DONE. 21 VERY MARD FOR DNE VENDOR TO DEVELOP 300 AND SUPPORT DESIGN.
GUESTION	26-11A-B1-DIRECTIONAL TRANSLATION OF DATA 26-11A-B1-DIRECTIONAL TRANSLATION OF DATA 20-11C-NOVE DES/DATA AMONG SIMILAR APPL. 29-11D-STORE MEM DATA IN MEUTRAL FILE FRMT 30-11E-EA SOFTWARE APPL. BEST IN 115 CLASS

RESPONSE

CAIEGOAY=06-HCH DESIGN ENVIRONMENT

11	DOM'T DO 11.
COMMENT	DON .
RESPONSE	23
90651168	32-12A-SYSTEM SPECIFICATIONS

PROGRAM = COMMENTS

CATEGORY.06-MCM DESIGN ENVIRONMENT (CONTINUED)

93-128-545EM PARTITIONING 33-128-545EM PARTITIONING 33-128-545EM PARTITIONING 33-128-545EM PARTITIONING 33-128-645EM PARTITIONING 33-128-64-661M PECMOLOGY SELECTION 36-12E-54PPRATIME TECHNOLOGY SELECTION 36-12E-54PPRATIME TECHNOLOGY SELECTION 36-12E-54PPRATIME TECHNOLOGY SELECTION 36-12E-54PPRATIME TOWNORMES W/DESIGN KITS 36-12E-54PPRATIME TOWNORMES TANDARD 41-17B-1ECHNOLOGY OFFERED BY MANAFACTURER 41-18B-15EF/FOCS 42-18C-1EC-550 42-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1ES-550 43-18C-1ES-550 43-18C-1EC-550 43-18C-1ES-550 43-18C-1ES-550 43-18C-1ES-550 43-18C-1ES-550 43-18C-1ES-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1ES-550 43-18C-1ES-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1ES-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-1EC-550 43-18C-550 43	NUSBER NUSBER 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7	CONNENT HIGH LEVEL SIMULATION NOT THERE. CONSIDERAND MULTILAYER. USING SINGLE LAYER NOW. CONSIDERAND MULTILAYER. USING SINGLE LAYER NOW. CONSIDERAND MULTILAYER. USING SINGLE LAYER NOW. CONNENT GEVE MELT IN SIMULATION AND VARIATION. MAYE TO DRAW ON PAST "MASH" I GOVE ALL TOO SHOOTH." CONNENT CONNENT HAYER TO DO N'T GUARANTEC. LIMITED AT THIS POINT. CONNENT HAYER TO DO WITH DIFFERENT TOOL SETS AND INTERFACE EXP. HAYER TO DO WITH DIFFERENT TOOL SETS AND INTERFACE EXP. HAYER TO DO WITH DIFFERENT TOOL SETS AND INTERFACE CXP. HAYER TO DO WITH DIFFERENT TOOL SETS AND INTERFACE CXP. HAYER TOO WHOUSE, SOME SUBCONTRACTED. HAYBE MAYBE MAYBE
CATEGORY=10-DESIGN TOOLS		
	RESPONSE	
72-9A-TOOLS FOR CAE	-	SYNOPSIS VIEWLOGIC, CADENCE, VARIOUS SIMULATORS.
PROGRAM . COMMENTS		

CATEGORY=10-DESIGN TOOLS (CONTINUED)

COMMENT	MENIOR GRAPHICS		SULVE CONTRACTOR CONTR			EDA	FINESSE, MEN SOFTWARE	SASSICA STANDA CAPATICA		THEDA, EUCLID			INTERNALLY DEVELOPED TOOLS	CONSILICM	IN HOUSE DESIGN	IN HOUSE LITTON DEVELOPED SYSTEM	DON'T KNOW, TO BE DETERMINED.	IN HOUSE DESIGN		SUR SYSTEM	MOVING TO MENIOR GRAPHICS	MENTOR, WHOL	NO.		MENTOR			COMMENT	ARE NOT HIGHLY INTEGRATED."	L E	MERIS IN FRECLOUME. AL	SUFTWARE IS EXPECTED IN TAKE CLUMPINESS OF		ELECTING STRICE. DOR'L SAVE FOLLY INTEGRALED STRICT.	O METANOCIO	******	10. 00.00mm. 0. 00.00	THOUSEN AND THE PARTY OF THE PA	DET IS STILL BEREGEL. THE STORES ARE BEING CLOSENCE OF	
RESPONSE	1.5	21	56	27	20	-	21	<u>~</u>	12	56	2.7	9	-	15	21	76	2.7	82	-	12	15	21	56	22	3.0		RESPONSE		-	12	12	12	51	2.1	21	92	27	27	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	5
QUES110*		72-9A-100LS FOR CAE	S FOR	5	S FOR CA	S 788		S FOR	S FOR CA	FOR CA	S F0#	101	FOR CA	FOR CA	£0	FOR CA	101	404	S	s	S FOR	100	75-90-100LS FOR DVERALL	75-90-1001S FOR OVERALL	1-06-	CATEGORY=11-OVERALL SATISFACTION		#0115110#	20-10-0VERALL SATISFACTION	SATISFACTIO		79-19-OVERALL SAIISFACTION	79-19-OVERALL SATISFACTION	I SFACT 10		SFAC110	SATISFACTIO	79-19-OVERALL SATISFACTION	ē	79-19-OVERALL SATISFACTION

COMMENT

al sponse number

DESCRIPTION

COMPANY MANE	MANE	=	DIGITAL FOCIPMENT CORPORATION
		12	
		51	EAVES MICHOCORPUTER PRODUCTS
		7.7	
		3.6	LITTOR ANCOM:
	•	23	STORAGOS
		2	RAYTHEOM
BENEBAL	SENERAL COMMENTS	13	ITS REW TECHNOLOGY, NOT AT COLNERCIAL PRICING.
)		~	INTODIANT TEAT ABOUT CONTINUE TO FEND ARSEACH SO TRENDEDGY CAN
			CONTRACE TO GROW.
		2.3	TECHNOLOGY IS COMING. NEED TO SOLVE DESIGN AUTOMATION PROCESS AND
		2.7	ABUINE GOOD BARE DIE AND INTO ON BARE OIE ON NON-DIGITAL PROD.
		2	NOTE MEN ICCHNOLOGY TAKES OFF. WORKING ON INTRASTRUCTURE TO REEP COST
		2	DOWN
111 V F B V F &	SHALE CORRESTS	-	ME. ATRINSON WOULD NOT MATE THE DEGREE OF SATISFACTION HE EXPECTED TO
			EXPERIENCE AND WOULD SAY ONLY THAT HE EXPECTED TO MAYE HIS ENGINLERS "BE
		-	MAPPY". (SEE OUESTIONS 5, 10, 11, 12, 14, 186)
		7.7	THIS IS AN RED FACILITY AND ME DID NOT FEEL ME COULD ANSWER TME
		7	SATISFACTION PART ON SOME QUESTIONS.
		92	COULD NOT GIVE SATISFACTION RATINGS BECAUSE "WE ARE JUST GETTING INTO
		92	ECE.00. a
		27	WOULD LIKE A COPY OF STUDY WHEN COMPLETE.
		2.0	COULD NOT ANSWER SATISFACTION MATINGS, JUST GETTING INTO IT.

G.	EDA Commercial Vendor List

EDA Commerical Vendor List

3F Designs Accel Technologies Actel Acugen Advanced Microcomputer **Systems** Advantest **AET Associates** Aldec Altera Ansoft Corp. **APSI** Ariel Corp. Array Microsystems, Inc. Ascent AT&T **Automated Logic** Design **CAD Artisans CAD Software CAD Solutions** Cadence CadSoft Computer **CADstar** Calav **CAM Software** Research Capilano Computing Cascade Checklogic Chronology Corp. **CLSI** Comdisco Compact Software Compass

Computervision

Concept Circuit Design Concurrent Logic Consultek Software Systems, Inc. Contec Microelectronics Cooper & Chyan Technology, Inc. Crosspoint Cypress Semiconductor Data I/O Design Computation Design Automation Deutsch Research Douglas Electronics Eagleware **EEsof** Engineerium Epic Epoch **Evaluations Per** Second Exemplar Logic, Inc. Fintronic Flomerics, Inc. GenRad Hanson Engineering Elcad Harris EDA HDL Systems HP Hyperception i-Logix IBM/Altium

ICT

IKOS

Impex Design Solutions INCA Infinite Graphics Integrated Circuit **Applications** Integrity Engineering Interactive CAD **Systems** Interconnex Interference Control Tech. Intergraph InterHDL Design Intusoft **ISDATA** Layout Concepts Lehdar Systems Corp. Lewis Systems Lightwave LMSI Logic Modeling Corp. Logical Devices Legical Devices, -Iner LSI Mag Soft Corp. Massteck Mental Automation, Inc. Mentor Meta-Software Microsim MINC Model Technology **NEC Electronics** NeoCAD

Nextwave

OEA International Omation Orcad PADS Software. Inc. **PCAD** Penzar **Philips** PIE Design **Systems** Plus Logic Powertronic Systems, Inc. Precision Graphics Protel Technologies Quad Design Quantic Labs Ouicklogic Ouickturn Racal Redac Ready Systems Redwood Design Automation Rohde and Schwarz Router Solutions Rubow Systems Seed Solutions SES Signetics Company Silicon Automation Systems **SimQuest** Simucad Simulation Technologies Simutest SONET

Source III. Inc. Spectral Innovations Spectrum Software Spectrum Signal Processing, Inc. Sunrise Sunrise Test Systems SWIFT Enterprises Synopsys Syntest T-Cubed Systems Tanner Research Tatum Labs, Inc. TD Technologies TEAM Teradyne TESoft Testniques, Inc. The Great SoftWestern Texas Instruments Ultimate Technology Vantage Viewlogic Vista **Technologies** VLSI Wellspring Solutions Wintek Corp. WISE Software Solutions Xilinx Zuken

Zycad